ALTERNATIVE FISHERY STATISTICAL INFORMATION SYSTEMS FOR CENTRAL AND WESTERN PACIFIC REGIONS WITHIN MANAGEMENT PURVIEW OF THE UNITED STATES WESTERN PACIFIC REGIONAL FISHERY MANAGEMENT COUNCIL

Living Marine Resources, Inc.
7169 Construction Court
San Diego, California 92121

Contractor

NOAA Contract No. 03-7-208-35257

April, 1979

PREFACE

This report was prepared by Living Marine Resources, Inc. under NOAA contract number 03-7-208-35257. The contract objective was to develop fishery statistical information systems for collection of catch and effort statistics from commercial and recreational fisheries in Hawaii, American Samoa, Guam, and the Northern Marianas to meet the needs of the Western Pacific Regional Fishery Management Council. The statements, findings, conclusions, and recommendations included herein are those of the contractor and do not necessarily reflect the views of the National Marine Fisheries Service.

Richard S. Shomura
Director, Honolulu Laboratory
September 1979

TABLE OF CONTENTS

1. INTRODUCTION

This document represents the final report by Living Marine Resources, Inc. on work done in fulfillment of contract number 03-7-208-35257, entitled "Fishery Statistical and Information System." The objectives of contract work and this report, as stated in RFP NASO 7-35257, are

> "...to develop fishery statistical information systems for collection of catch and effort statistics from both commercial and recreational fisheries in Hawaii, American Samoa, Guam, and the Northern Marianas to meet the management needs of the Western Pacific Regional Fisheries Management Council."

More specifically, the contract objectives and scope of work are to:

> "1. Specify statistical and information needs of WPRFMC, Department of Commerce, State of Hawaii, American Samoa, Guam, and Northern Mariana Islands.
>
> "2. Evaluate present marine fishery statistical and information systems in Hawaii, Guam, American Samoa, and Northern Mariana Islands and determine shortcomings with respect to the needs spelled out in Objective 1.
>
> "3. Develop alternative systems, either modifications of existing systems or totally new systems, that will satisfy the needs specified in Objective 1 and be as compatible as possible with existing state and territorial systems including the regional data management system.
>
> "4. Develop cost-benefit analysis of alternative systems.
>
> "5. Evaluate and rank alternative systems according to cost-benefit analysis, compatibility with existing systems, and practicality of implementation.
>
> "6. For the top two or three systems, develop implementation procedures and timetables."

As stated above and elsewhere in the RFP, "The...study relates to the collection of biological data." While important, economic and sociological data requirements are outside the terms of reference of this study and are consequently not addressed in this report.

The report that follows is organized in five sections. This introduction comprises Section 1. Section 2 summarizes the principal points and conclusions discussed in detail in Appendices 6.1 and 6.2 (described below): the major users of fishery information in the central and western Pacific within the purview of the Western Pacific Regional Fishery Management Council are identified and their institutional objectives and jurisdictions defined; all of the major fisheries, and those of priority interest to the Council are delineated; the catch and effort indices - the actual data to be collected - deemed required by the Council as well as the National Marine Fisheries Service (NMFS) and state, territorial and commonwealth fishery agencies are listed, and; the specific catch and effort information needs of the Council are described, along with the degree to which current data collections activities satisfy Council requirements.

Section 3 defines the important features of a "management information system" (MIS), describes the results of the detailed agency-by-agency examination of data collection and processing alternatives contained in Appendices 6.3 (described below), and presents three MIS' recommended as most practical and feasible for the region.

In Section 4, possible procedures for implementing alternative MIS' recommended in Section 3 are described.

Sections 1-4 assemble the principal study observations, issues, conclusions and results, thus comprising the main body of the report. Section 5 summarizes the results of the study. Section 6 assembles as appendices considerable detailed information and analyses necessary as a preliminary to the formulation of study conclusions. Appendix 6.1 provides a detailed examination of the catch and effort information needs of the Council and each fishery agency under the purview of the Council. Appendix 6.2 compares fishery information needs, as defined in 6.1, to data presently produced by existing fishery data collection systems on an agency-by-agency basis in order to identify areas where data availability falls short of requirements. Appendix 6.3 presents data collection and processing alternatives for each fishery agency, and compares and ranks these alternatives as to their cost, practicality and feasibility. Appendix 6.4 gathers the data collection forms presently utilized by each fishery agency. Appendix 6.5 presents a pilot logbook proposal for region recreational fisheries formulated by National Marine Fisheries Service and the Hawaii Division of Fish and Game.

2. FISHERY INFORMATION REQUIREMENTS OF THE WESTERN PACIFIC REGIONAL FISHERY MANAGEMENT COUNCIL - THE ADEQUACY OF CURRENT COLLECTION ACTIVITIES

A poll of the various users of fishery information in American Samoa, Guam, Hawaii and the Northern Mariana Islands as to their institutional objectives and biological data needs to fulfill those objectives initiated contract work. This field work identified the American Samoa Office of Marine Resources, the Guam Aquatic and Wildlife Resources Division, the Hawaii Division of Fish and Game, the Northern Marianas Fishing Authority, the National Marine Fisheries Service - Honolulu Laboratory, and the Western Pacific Regional Fishery Management Council as those agencies primarily responsible for the collection or utilization of basic fishery data in the region. These six agencies and their institutional objectives - to which fishery data are an input - and areas of jurisdiction are identified and summarized in Table 1 as a first step in the determination of fishery information needs in the central and western Pacific.

Another objective of the initial project field work was to identify all the domestic and foreign fisheries in the region, as well as their magnitude and characteristics, for which fishery data are required, and more specifically, those fisheries (focus fisheries) of management interest to the Council. This provides an important indicator of the magnitude of the data collection and processing task. Table 2 summarizes this information, which is discussed in detail by area in Appendix 6.1, listing all the fisheries of any significance in each area and indicating those of Council concern.

Discussions with agency personnel, fishermen and scientists, and analysis of agency objectives and information requirements yielded the list of catch and effort indices shown in Table 3. These indices encompass all the data to be collected in each area. The same table formats including all indices are utilized in the detailed agency-by-agency and fishery-by-fishery analyses of data requirements and the adequacy of current data collection activities contained in Appendices 6.1 and 6.2. Of course, the type and range of indices to be collected vary by fishery and agency.

Tables 4 and 5, using the above-mentioned format, list the fisheries in the region of primary Council concern and details of catch and effort data requirements of the Council in each fishery. Table entries indicate the specific data items and the required periodicity of collection need by the Council in order to fulfill its mandate of preparing and updating management plans for fishery resources - with the exception of tuna resources - in the fishery conservation zone seaward of the State of Hawaii, the Commonwealth of the Northern Marianas and the Territories of Guam and American Samoa. These plans are to contain a detailed description of the relevant fishery, an assessment of the present and probable future condition of the fishery, its maximum sustainable and optimum

TABLE 1. Major Fishery Data User Groups in the Central and Western Pacific and Their Institutional Mandates and Jurisdiction.

• USER GROUP

American Samoa Office of Marine Resources

OBJECTIVES

Conservation and management of Territorial Marine Resources by providing accurate descriptive data on present fishing activities, developing and implementing productive research programs, and by encouraging and assisting in the development of Samoan fisheries.

JURISDICTION

Marine waters surrounding each island seaward out to three miles from shore.

• USER GROUP

Guam Aquatic and Wildlife Resources Division

OBJECTIVES

Make estimates on total fish catch, determine results of different fishing methods, areas fished and the amounts of each species taken. Determine fish population trends in order to formulate effective management programs.

JURISDICTION

For marine waters, that ocean area surrounding the island seaward out to three miles from shore.

Table 1 (Cont.)

• USER GROUP

Hawaii Division of Fish and Game

OBJECTIVES

Development and management of State renewable aquatic resources for wisest and optimal utilization.

JURISDICTION

Presently not clearly defined; traditional three-mile limit around individual Islands recognized by Federal Government; the State claims extended jurisdiction based on archipelago theory.

• USER GROUP

Northern Marianas Fishing Authority

OBJECTIVES

Monitor fishing activities for regulatory, conservation and development planning purposes.

JURISDICTION

Marine waters surrounding each island seaward out to three miles from shore.

• USER GROUP

National Marine Fisheries Service, Honolulu Laboratory

OBJECTIVES

Develop and implement research programs that produce data and knowledge necessary for the protection, wise use and management of United States living marine resources. Assist in the development and maintenance of commercial and recreational marine fisheries, as well as the aquaculture industry. Conserve and manage fish resources in the Fishery Conservation Zone (FCZ) - defined as that area seaward of the boundaries of state/territorial jurisdiction out to 200 nautical miles.

Table 1 (Cont.)

JURISDICTION

For research purposes, all marine waters, including estuaries, from shore out to the limits of the FCZ; with respect to conservation and management responsibilities, area of jurisdiction corresponds with that of the WPRFMC (see below).

• USER GROUP

Western Pacific Regional Fishery Management Council

OBJECTIVES

Prepare fishery management plans, and from time to time, such amendments to plans as are necessary; review on a continuing basis and revise as appropriate assessments of present and probable future condition of relevant fisheries, their maximum sustainable yields and harvest available to foreign fishermen.

JURISDICTION

Those fishery resources (including precious coral) in the FCZ around Hawaii, American Samoa and Guam. Also, those fishery resources which are primarily exploited in the FCZ (in cases when exploitive activities take place in both state/territorial and FCZ waters). Inshore resources may also fall under WPRFMC purview in special cases, such as when state or territorial authorities lack the capability to manage such resources deemed requiring management.

Table 2. Agency cross-interests in all regional fisheries. Fisheries for which data is needed by the WPRFMC are focus fisheries.

Fishery	Agency					
	Western Pacific Regional Fishery Management Council	National Marine Fisheries Service	American Samoa Office of Marine Resources	Guam Aquatic and Wildlife Resources Div.	Hawaii Fish and Game	Northern Marianas Fishing Authority
American Samoa						
Diving			x			
Handline						
Commercial			x			
Subsistence			x			
Shoreline						
Handpicking			x			
Hook and line			x			
Stationary nets, weirs			x			
Throw nets			x			
Traps			x			
Troll						
Commercial/charter	x[1]		x			
Small boat	x[1]		x			
Guam						
Inshore						
Handpicking and spear (diving)				x		
Hook and line				x		
Net				x		
Offshore						
Handline				x		
Spear (diving)				x		
Troll	x[1]			x		
Ponds, Weirs				x		
Hawaii						
Diving						
Aquarium					x	
Spear, gathering					x	
Handline						
Akule/opelu					x	
Deepsea (bottomfish)	x				x	
Inshore (bottomfish)					x	
Tuna	x[1]	x[3]			x	

Table 2 (Cont.)

Fishery	Agency						
	Western Pacific Regional Fishery Management Council	National Marine Fisheries Service	American Samoa Office of Marine Resources	Guam Aquatic and Wildlife Resources Div.	Hawaii Fish and Game	Northern Marianas Fishing Authority
Hawaii (Cont.)						
Longline ("ahi")	x[1]	x[3]			x	
Net						
Akule					x	
Bait					x	
Gill net					x	
Tangle (crab)					x	
Trawl					x	
Pole and line ("aku")	x[1]	x[3]			x	
Pond					x	
Precious coral	x				x	
Shoreline						
Handpicking					x	
Pole and line					x	
Throw nets					x	
Trap						
Bottomfish	x[2]				x	
Crab					x	
Lobster	x				x	
Shrimp					x	
Troll						
Commercial/charter	x[1]	x[3]			x	
Small boat	x[1]	x[3]			x	
Northern Marianas						
Commercial line					x	
Small boat						
Inshore					x	
Offshore	x[1]				x	
Traps, weirs					x	
Internat'l and Foreign Fisheries						
Domestic tuna						
Pole and line ("aku")		x				
Purse seine		x				
Troll		x				

Table 2 (Cont.)

Fishery	Agency					
	Western Pacific Regional Fishery Management Council	National Marine Fisheries Service	American Samoa Office of Marine Resources	Guam Aquatic and Wildlife Resources Div.	Hawaii Fish and Game	Northern Marianas Fishing Authority
Int'l and Foreign Fisheries (Cont.)						
Foreign						
Bottomfish						
Line	x 2/					
Trawl	x 2/					
Precious coral	x 1/	x 3/				
Tuna longline		x 3/				
Tuna pole and line		x 3/				

1/ Primarily billfish, dolphin (mahimahi), shark and wahoo.

2/ Primarily NW Hawaiian bottomfish.

3/ Primarily tuna.

TABLE 3. Useful catch and effort - identified by agency personnel in the Western Pacific Regional Fisheries Management Council area.

Effort Indices
Effort description[1/]
Number of fishermen (anglers)
Number of vessel-trips
Number of angler-trips
Days/hours absent
Days/hours searching
Days/hours fishing
Statistical area
Area fished (dragged, pond)
Depth gear set
Number of hooks/traps/lines nets
Bait type
Bait quantity used
Number of gear sets
Number of successful sets
Catch Indices
Number of schools sighted
Number of schools fished
Number of fish caught/landed
Weight of fish caught/landed
Statistical area of catch
Date/time of catch
Depth of catch
Species composition
Size composition (by species)
Sex composition (by species)

1/ "Effort description" encompasses such data as vessel/fishermen identification, vessel and fishermen numbers, vessel characteristics (owner's and captain's name, radio call sign, vessel length, beam, tonnage, engine size, fuel/bait/fish hold capacity, gear type and description, crew size, and port), other gear characteristics, port and landing/launching site characteristics, and possibly fishermen profile information.

TABLE 4. Fishing effort data needs, Western Pacific Regional Fishery Management Council. Entries reflect desired data collection periodicity.[1] Underlined entries are essential data.

Fishery	Effort description	No. fishermen (anglers)	No. vessel-trips	No. angler-trips	Days/hours absent	Days/hours searching	Days/hours fishing	Statistical area	Area fished (dragged, pond)	Depth gear set	No. hooks/traps/lines/nets	Bait type	Bait quantity used	No. gear sets	No. successful sets
Effort Data															
Billfish[2]															
Dom. commercial/charter troll	7						4	4			4				
Domestic small boat troll	7			4			4	4			4				
Domestic tuna handline	7		4				4	4			4				
Domestic tuna pole and line	7					4	4	4			4				
Tuna longline[3]	7						4	4			4				
Bottomfish[4]															
Domestic NW Hawaiian handline	7						4	4			4				
Domestic NW Hawaiian trap	7						4	4			4				
Foreign line	7						4	4			4				
Foreign trawl	7						4	4	4						
NW Hawaiian lobster[5]	7						4	4			4				
Precious coral															
Domestic Hawaiian	7		4				4	4							
Foreign	7						4	4	4						

1/ Symbols. Periodicity: 1=by trip, 2=daily, 3=weekly, 4=monthly, 5=quarterly, 6=yearly, 7=by periodic survey

2/ Includes species often taken with billfish (e.g. dolphin, pelagic shark, wahoo).

3/ Domestic and foreign fisheries.

4/ Includes alphonsins, armorheads.

5/ Only the NW Hawaiian fishery is currently of interest to the WPRFMC.

TABLE 5. Fishery catch data needs, Western Pacific Regional Fishery Management Council. Entries reflect desired data collection periodicity.1/ Underlined entries are essential data.

Fishery	Catch Data									
	No. schools sighted	No. schools fished	No. fish caught/landed	Wt. fish caught/landed	Statistical area of catch	Date/time of catch	Depth of catch	Species composition	Size composition(by species)	Sex composition(by species)
Billfish2/										
Dom. commercial/charter troll			4		4	4		4	4	
Domestic tuna small boat troll			4		4	4		4		
Domestic tuna handline			4		4	4		4	4	
Domestic tuna pole and line				4	4	4		4		
Tuna longline 3/			4		4	4		4	4	
Bottomfish4/										
Domestic NW Hawaiian handline				4	4	4		4		
Domestic NW Hawaiian trap				4	4	4		4		
Foreign line				4	4	4		4		
Foreign trawl				4	4	4		4		
Domestic NW Hawaiian lobster5/			4	4	4	4		4	4	
Precious coral6/				4	4	4		4		

1/, 2/, 3/, 4/, 5/ See footnotes, Table 4.

6/ Domestic and foreign fisheries.

yield, the capacity of American fishermen to exploit the resource, and the amount, if any, available for foreign exploitation. Additionally, conservation and management measures applicable to both foreign and domestic fishermen are to be formulated.

Council information requirements shown in Tables 4 and 5 are the product of the exhaustive analysis of individual agency data needs referenced in Appendix 6.1. This is because nearly all of the required effort and catch/landing data describing domestic activities will be supplied by State/Commonwealth/Territorial data collection systems. In isolated cases, Council needs for more detailed data may require collection activities under Council auspices in certain domestic fisheries. Arrangements for collection of required data describing targeted foreign fishing activities will necessarily be the responsibility of NMFS. Foreign and domestic fisheries exploiting billfish, precious coral, bottomfish (including alphonsins and armorheads) and NW Hawiian lobster are targeted by the Council. With the exception of effort descriptive data, a monthly compilation of specified data items is thought adequate. Data needs in the tuna handline, tuna longline and troll fisheries relate only to billfish, not tuna.

Tables 6 and 7 compare present data collection activities of State/Territory/Commonwealth fishery agencies in the region with information requirements as formulated for the Council above. These tables represent a synthesis of the detailed agency-by-agency examination of current data collection activities of local agencies and the degree to which they fulfill local and Council information requirements contained in Appendix 6.2. In Tables 7 and 8, current local agency data collection activities are described with respect to the degree to which they satisfy Council, not local agency needs.

Where current data collection activities do not satisfy Council needs, non-satisfaction is of three types. First, some data items deemed essential by the Council are judged either only helpful (not essential) or not needed at all by the appropriate collecting agency. Second, some data items are seen as requiring more frequent collection by the Council than by the collecting agency. Third, even when priority and collection periodicity match, for some data items current collection activities are inadequate to meet needs.

In cerain instances of non-satisfaction of Council data requirements, especially of type one or two (above), the Council may find it necessary to institute either one-time (e.g. a fishery profile survey) or continuing data collection programs to gather the required essential information.

Table 6. Degree to which current agency data collection activities satisfy Western Pacific Regional Fishery Management Council effort data needs (Table 12). Entries for essential needs underlined.[1]

Fishery	Effort description	No. fishermen (anglers)	No. vessel-trips	No. angler-trips	Days/hours absent	Days/hours searching	Days/hours fishing	Statistical area	Area fished (dragged, pond)	Depth gear set	No. hooks/traps/lines/nets	Bait type	Bait quantity used	No. gear sets	No. successful sets
Effort Data															
Billfish[2]															
Domestic comm./charter troll,															
Amer. Samoa OMR[3]	S						N	N			N				
Hawaii DFG	S						S	N			N				
Domestic small boat troll,															
Amer. Samoa OMR	S			N			N	N			N				
Guam AWR	S			2			2	2			2				
Hawaii DFG	S			N			S	N			N				
N. Marianas offshore FA[4]	S			N			N	N			N				
Domestic tuna handline,															
Hawaii DFG	S		5				5	N			N				
Domestic tuna pole and line,															
Hawaii DFG	4					N	4	N			4				
Tuna longline,															
Domestic, Hawaii DFG	S						S	N			S				
Foreign, NMFS	4						4	4			4				
Bottomfish															
Domestic fisheries[5]															
NW Hawaiian handline, DFG[6]	S						S	S			S				
NW Hawaiian trap DFG[6]	S						S	S			S				
Foreign fisheries															
Line, NMFS	N						N	N			N				
Trawl, NMFS	N						N	N	N						
NW Hawaiian lobster[7]															
Hawaii DFG[6]	S						S	S			S				
Precious coral															
Domestic Hawaii DFG	5		5				5	5							
Foreign, NMFS	N						N	N	N						

Table 6 (Cont.)

1/ Entry Symbols: Degree to which needs are satisfied.

1= 0 - 25 percent	N= Data not collected
2= 26- 50	S= Some data collected. Degree to which needs satisfied not known.
3= 51- 75	
4= 76- 89	
5= 90-100	U= Data collection unknown.

2/ Billfish includes dolphin (mahi mahi), shark, wahoo.

3/ Agency abbreviations.

4/ N. Marianas small boat troll is part of "small scale offshore" fishery.

5/ Only those domestic FCZ fisheries for this species group in areas where there is a foreign fishery for this species group are of management interest to the WPRFMC.

6/ Includes NMFS data collection activities for Hawaii DFG.

7/ Only the NW Hawaiian fishery is currently of management interest to the WPRFMC.

Table 7. Degree to which current agency data collection activities satisfy Western Pacific Regional Fishery Management Council catch data needs.1/ Entries for essential needs are underlined.

Fishery	Catch Data: No. schools sighted	No. schools fished	No. fish caught/landed	Wt. fish caught/landed	Statistical area of catch	Date/time of catch	Depth of catch	Species composition	Size composition (by species)	Sex composition (by species)
Billfish2/										
Dom. comm./charter troll,										
Amer. Samoa OMR 3/			2		N	2		2	N	
Hawaii DFG			S		S	S		S	N	
Domestic small boat troll,										
Amer. Samoa OMR			S		S	S		S		
Guam AWR			2		2	2		2		
Hawaii DFG			S		S	S		S		
N. Marianas offshore FA4/			S		N	S		S		
Domestic tuna handline										
Hawaii DFG			S		5	5		5	N	
Domestic tuna pole and line										
Hawaii DFG				5	4	5		5		
Tuna longline										
Domestic, Hawaii DFG			S		5	5		5	N	
Foreign, NMFS			4		4	4		4	N	
Bottomfish										
Domestic fisheries5/										
NW Hawaiian handline, DFG 6/				5	5	5		5		
NW Hawaiian trap, DFG 6/				5	5	5		5		
Foreign										
Line, NMFS				N	N	N		N		
Trawl, NMFS				N	N	N		N		
NW Hawaiian lobster trap 7/										
Hawaii DFG 6/			S	5	5	5		5	S	
Precious coral										
Domestic, Hawaii DFG				5	5	5		5		
Foreign, NMFS				N	N	N		N		

1/, 2/, 3/, 4/, 5/, 6/, 7/ See footnotes, Table 6.

3. ALTERNATIVE MANAGEMENT INFORMATION SYSTEMS

3.1 INTRODUCTION

The objective of this section is to develop alternative "management information systems" (MIS) to gather, store and make available in a convenient form catch and effort data necessary for preparation of management plans for the Western Pacific Regional Fishery Management Council.

For this report, an MIS is considered to be composed of three parts. The first, data collection and reporting, consists of techniques, equipment and personnel necessary to gather needed data in the field. The second, data reduction, consists of techniques, equipment and personnel necessary to convert basic collected data into usable form. The third, storage and retrieval, consists of equipment and personnel necessary to store and edit master Council data files and to retrieve data subsets from these files for analysis, principally by the Council's management plan development teams.

In contrast to the discussion of all agency data needs in Sections 2 and 3, this and remaining section deal primarily with those fisheries and catch/effort data items identified as essential to satisfying the Council's mandate. Alternate management information systems are developed to collect, process, store and retrieve data.

Collection of fishery data not needed by the Council is not formally developed. However, the systems proposed are compatible with existing agency systems.

To facilitate the discussion of alternate MIS', the following are assumed:

1. Alternative MIS' are computer-based.

2. Data collection produces raw fishery catch/effort data recorded on collection forms designed for direct key punching without transcription onto coding forms.

3. Data reduction produces verified and validated data in standard format, in electronically readable form ready to merge with existing master files.

4. Storage and retrieval alternatives take reduced data, if necessary convert formats to Council standards, merge new data with existing files and produces subfiles for use by council analysis.

3.2 DATA COLLECTION

Data collection encompasses techniques, personnel and equipment necessary to gather catch/effort data from original sources. Typically, data sources include individual fishermen, organized fishermen's cooperatives, individual buyers, and wholesale and retail market participants. Techniques fall into three general types: vessel logbooks or periodic reporting by fishermen; periodic surveys or interviews of fishermen or markets; and fish tickets completed by first buyer to record the flow of fish through commercial channels.

The logbook approach provides detailed catch and effort information by area of capture. The logbooks are completed by the vessel captain. Log completion and submission may be mandatory (usually tied to a fisherman licensing system) or voluntary. A voluntary logbook system usually produces less data than does a mandatory system. However, the voluntary method produces better quality information. When only a small number of fishermen or vessels are involved, logs can be placed with each operating gear. However, when there are a large number of operators, a sample of the total will suffice. Logbooks are an effective technique to gather detailed information on fishing operations in fisheries where extended trips are usual.

Survey techniques utilize trained personnel to circulate among fishermen, gathering the required information through interviews of all or a sample of all operators. This approach is particularly effective, and not faced with prohibitive costs, when fishermen are accessible at a central gathering point - a principal harbor or market. Survey costs mount sharply as the dispersion of interviewees increases.

A fish ticket system requires that at least a major portion of the catches on which data are to be gathered enter commercial channels. The tickets are completed - and data generated - by the buyer when the fisherman sells his catch. All fish buyers - wholesale and retail dealers, processors and in some cases, brokers - are usually required to complete a ticket for each purchase. A copy of each ticket is submitted by the buyer to the collecting agency; data on these tickets become the basic data for the system. The fish ticket approach lends itself to the collection of data on the quantity landed, by species, area and gear; value by species is also obtained.

Details of the three techniques, as well as necessary personnel and equipment, for each western Pacific collecting agency are discussed in Appendix 6.3. Included in the appendix discussion is an agency-by-agency ranking of the alternatives. Table 8 summarizes the results of this ranking.

TABLE 8. Summary results of ranking individual agency data collection and reduction alternatives aimed at WPRFMC needed fishery data.[1/]

Agency/fishery	Data Collection Alternatives				Data Reduction Alternatives	
	Fish Ticket	Log	Survey	Log Survey	Local	Central
American Samoa troll[2/]	-	1	2	-	2	1
Guam troll	-	3	1	2	1	2
Hawaii					2	1
Longline	1[4/]	1	2	-		
NW bottomfish/lobster[3/]	1[4/]	1	2	-		
Pole and line	1[4/]	1	-	-		
Precious coral	-	1	-	-		
Troll [2/]	1[4/]	1	-	-		
Tuna handline	1[4/]	2	1	-		
Northern Marianas troll	-	1	2	-	2	1
NMFS (foreign fish)					1	2
Tuna longline	-	1	-	-		
Bottomfish line/trawl	-	1	-	-		
Coral trawl	-	1	-	-		

1/ Symbols: 1=first rank; 2=second rank; 3=third rank; -=option not developed.

2/ Combines commercial/charter and small boat troll fisheries.

3/ Combines line and trawl bottomfish and lobster trap fisheries.

4/ The existing Hawaiian fish ticket system should be continued to collect data from those fisheries where the catch is sold.

3.3 DATA REDUCTION

Once collected, basic fishery catch/effort data needed by the Council must be translated (or reduced) from field collection forms to a format for storage and retrieval in the central computer system.

Data reduction encompasses data entry, verification and validation, leading to periodic merging of new data files with central master files. Data is entered either onto paper cards (punched) or written onto a magnetic medium (e.g. tape or disk) via a cathode ray tube (CRT) or hardcopy (e.g. teletype) keyboard terminal.

Following entry, the new data file must be verified, and checked against the original data forms. On a card-based system, the new card file is printed, then data items on each card image checked by hand. New cards are punched to replace ones containing errors. Verification on tape or disk-based system is considerably easier. Individual records (e.g. lines) are listed one at a time and checked directly by the terminal operator who makes necessary character or line changes at the terminal.

Following entry and verification, individual data items are validated or checked for consistency. This requires analysis to assure that values of data items are in ranges known to be appropriate for the particular item.[1/] Data can be validated using a computer program designed for the purpose or by graphing. During validation, questionable data items are flagged, then checked against original collection forms.

When a data file has been entered, verified and validated, it is transmitted to the central site to be merged with the appropriate Council master file. The format of data in any file created by data reduction need not be the same for all agencies submitting data to the system. As long as the data is present, in a usable format (e.g., card, tape of readable density, characters in readable code, etc.), and central site personnel know the format, data records can be easily translated into the Council's format at the central storage and retrieval system site.

There are three alternatives for reducing basic fishery data for use in the system - reduction by the collecting agency, central reduction at the same site at which Council master files are maintained, or mixed local and central reduction.

1/ e.g., for most marine fish species, the relation between length and weight is characteristic and known. In this case, length-weight data pairs in the new file could be checked to assure that weights fall within reasonable confidence intervals for given lengths, etc.

Local reduction requires that minimum data processing capabilities (personnel and machinery) be available to each collecting agency. Additionally, the agency must be able to reduce and transmit completed files to the Council on a timely basis. With local reduction, only minimal processing of received files (e.g., translation to Council formats) is necessary, thus reducing needed central site requirements. However, complete periodic updating of the master files proceeds at the pace of the slowest local agency. Additionally, the quality of data entry, its verification and validation is beyond the Council control.

Central reduction places no processing capability requirements on collecting agencies who submit collection forms or transcribed original data to the central site. Central reduction requires maximum central site processing capability. However, the entire process is under direct Council control, assuring consistent verification and validation quality. Assuming timely submission of original data, periodic control file updating is dependent only on the pace of the central organization.

Mixed site reduction allows local reduction by those agencies where this can be done while enabling central reduction of data from those agencies not having appropriate capability. Mixed site reducion, as opposed to central, probably would result in less than proportionate reduction in central site processing capabilities, since capacity sufficient to process part of the total incoming data would probably be almost, if not entirely, sufficient for doing the whole job. Reduction quality control and central file update timeliness would be more than that for local reduction and less than with central reduction.

Features of reduction facilities available to area agencies, as well as the feasibility of local reduction of agency-collected data is discussed in Appendix 6.3. Benefits and costs of local versus central reduction are assessed, resulting in a ranking of options for each agency (ranking summarized in Table 8).

3.4 DATA STORAGE AND RETRIEVAL

Following collection and reduction, data required by the Council must be stored in some central computer facility. The storage system should feature easy access for file entry via cards or tape (of different densities), efficient editing and subfile creation, permanent off-line disk or tape file storage, temporary on-line file storage, implement standard FORTRAN, amd most importantly, allow jobs (editing, file creation, programming, program analysis of subfiles) to be submitted remotely, preferably by terminals located at a site convenient to data users.

Ideally, system access terminals should be housed in a facility sufficiently large and central to enable data processing personnel and data users (principally plan development teams) easy access to data files. Data processing staff members need the capability to reduce raw data, periodically update master files with newly reduced data and in general to maintain central files. Data file users need the capability to analyze master files subsets - in the case of catch/effort data, generally by population dynamic analyses. Additionally, user/analysts will probably require periodic scientific programming, as well as data processing support.

Alternative sources of computer capability (computer, disk/tape storage, data transmission lines software, etc.) for the central file system include commercial time share service vendors and the NMFS-contracted time share service (INFONET). According to the Southwest Fisheries Center Data Manager, all Federal Government computer facilities in Honolulu are nearly fully utilized and not available. As outlined in Appendix 6.3, both University of Hawaii and Hawaii State systems are also fully utilized. The expected level of usage does not warrant Council purchase of a computer system and hiring of attendant operating personnel.

The expected relatively small data files and light usage suggest that commercial systems are probably not feasible, as customer service may not be adequate for a small user. However, Council computer needs could be added to those of NMFS-Honolulu, already making extensive use of INFONET. Thus, big-user service would be available to the Council. Additionally, Council plan development team analytic efficiency would be enhanced by use of INFONET since most teams will include at least one NMFS-Honolulu Laboratory scientist likely to be familiar with INFONET use. Council use of augmented NMFS/INFONET service is recommended.

Master file updating involves converting reduced data files to standard format where necessary, then merging new files with existing masters. At the expected level of activity and assuming monthly updating, this should require the services of no more than .1 man-year's programmer/facility manager time and .25 man-year's technician time. Access to a card/tape reader and .25 machine-year's data editing terminal are also needed.

Data file maintenance should likewise require .1 man-year's programmer and .25 man-year's technician time and .25 machine-year's editing terminal time.

Data processing capabilities necessary for users to assess and analyze data subsets depends on expected volume of use. As a rough approximation, .5 man-year's technician time and .5 machine-year's data editing terminal time should be sufficient. Access to a line printer is needed, although results of most analyses can probably

be output directly at the data editing terminal with little or no printing of volumes of information necessitating a line printer. Approximately .5 man-year's programmer time should be sufficient to support analyst activities.

Thus, as a first approximation, .7 man-year's programmer and 1.0 man-year's data processing technician time is needed at the central site. Additional technician time will also be necessary to reduce data where local reduction is not practical. Remaining programmer time (.3 man-years) could be used profitably for general supervisory work. Required technical labor could be borrowed from cooperating agencies such as NMFS. However, the required level of labor, plus the need for continuity, suggests that the best approach would be to hire these persons as members of the Executive Director's staff.

Minimum equipment necessary to maintain Council data files and to facilitate subfile analysis includes two data entry/editing terminals to be connected remotely via telephone lines to the computer system. Such terminals can be either CRT-based or printing. A useful combination would be one of each type. Equipment can be purchased, leased or borrowed from friendly agencies (NMFS, University of Hawaii), or commercial time share computer vendors if their system is used. Should listing large quantities of data or output become necessary, a small 132 column line printer may be desired. Access to keypunch machines, a card reader and tape readers will be needed for entry of agency-reduced data. This should be available through cooperating agencies (NMFS, Coast Guard).

Council data processing personnel and equipment should be housed in a central location where space is available for the plan development teams, the principal data base users. Alternative locations include the Council staff's Honolulu headquarters and the NMFS Honolulu Laboratory. The NMFS location presumably would be provided as part of NMFS support of Council activities. The cost of space at the Council headquarters would be at the commercial rate for this space. Locating at NMFS would carry the additional benefit of proximity to NMFS ADP personnel, as well as substantial scientific expertise. If space is available, NMFS Laboratory housing of Council ADP personnel and equipment is preferable to use of Council headquarter space.

3.5 ALTERNATIVE SYSTEMS

A complete alternative management information system consists of a particular data collection technique for each of the 12 fisheries listed in Table 8, and either local or central data reduction for each of the 4 agencies. Central storage and retrieval on the NMFS-used computer in Honolulu and staff location at the NMFS-Honolulu Laboratory are assumed. Thus, there are

3,072 theoretically feasible alternative MIS'.[1/]

The most obvious MIS is that composed of first rank alternatives for each agency-system part component of the system. For illustrative purposes, second and third alternatives can be identified.

The second alternative incorporates local rather than central reduction of American Samoa and Northern Marianas data. The quantitative cost of both reduction alternatives in these areas are identical; the ranking of central over local reduction is based on qualitative considerations (Table 9 and Appendices 6.3.3.1 and 6.3.3.4).

The third alternative is that composed of first rank data reduction techniques and second rank agency collection techniques. This alternative is motivated by the fact that quantitative costs of first versus second rank collection techniques are similar in all cases (Table 9).

1/ (2 Samoa collection options) x (2 Samoa reduction options) x (3 Guam collection options) x ... = 2x2x3x... = 3x2 = 3,072.

TABLE 9. Annual personnel and equipment requirements (in man-years and machine-years) by type for all agencies, all alternatives of all system parts of the Council Information Management System. Summary requirements for three suggested alternative complete systems are listed.

Agency Activity	Alternative Rank	Data Collection	Data reduction		Data storage and retrieval	
		Personnel[1]	Personnel[2]	Equip.[3]	Personnel[2]	Equip.[3]
AMERICAN SAMOA TROLL						
Data collection						
Log	1	.15				
Survey	2	.25				
Local data reduction	2		.10	.10		
GUAM TROLL						
Data collection						
Survey	1	.30				
Vol. log	3	.60				
Vol. log/survey	2	.80				
Local data reduction	1		.00	.00		
HAWAII						
Data collection						
Longline						
Log	1	.20				
Survey	2	.35				
NW bottomfish, lobster						
Log	1	.10				
Survey	2	.20				
Pole and line						
Log 4/	1	-				
Precious coral						
Log 4/	1	-				
Troll						
Log	1	- 5/				
Tuna handline						
Log	2	.50				
Survey	1	.40				
Local data reduction	2		1.00	1.00		

TABLE 9 (Cont.)

Agency Activity	Alternative Rank	Data Collection Personnel[1]	Data reduction Personnel[2]	Data reduction Equip.[3]	Data storage and retrieval Personnel[2]	Data storage and retrieval Equip.[3]
NORTHERN MARIANAS TROLL						
Data collection						
Log	1	.50				
Survey	2	.80				
Local data reduction	2		.25	.25		
NMFS HONOLULU[6]						
Data collection						
Log	1	.00				
Local data reduction	1		.00	.00		
COUNCIL						
Central data reduction						
American Samoa	1		.10	.10		
Guam	2		.50	.50		
Hawaii	1		.75	.75		
N. Marianas	1		.25	.25		
NMFS	2		.50	.50		
Storage retrieval						
Programmer					.70	
Technician					1.00	
Card reader						[7]
Entry/editing terminal						2.00
Keypunch						[7]
Printer						[7]
System 1[8]	1	1.65	1.10	1.10	1.70	2.00
System 2[9]	2	1.65	1.10	1.10	1.70	2.00
System 3[10]	3	2.90	1.10	1.10	1.70	2.00

TABLE 9 (Cont.)

Agency Activity	Alternative Rank	Data Collection Personnel[1]	Data reduction Personnel[2]	Data reduction Equip.[3]	Data storage and retrieval Personnel[2]	Data storage and retrieval Equip.[3]

Footnotes:

1/ Data collection personnel are biologists.

2/ Data reduction personnel are data processing technicians.

3/ Data reduction equipment: Keypunch or computer connected remote terminals.

4/ Existing data collection systems; no additional personnel and equipment required.

5/ Pilot study personnel requirement 2.15 man years; continuing requirement not known.

6/ Foreign tuna longline, bottomfish line and trawl, coral fisheries.

7/ Only occasional access to equipment of this type is necessary.

8/ System 1 incorporates first rank data collection and reduction techniques for all agencies.

9/ System 2 incorporates qualitatively inferior second rank reduction techniques for American Samoa and Northern Marianas.

10/ System 3 incorporates second rank data collection techniques, first rank data reduction techniques for all agencies.

4. IMPLEMENTATION

The objective of this section is to describe procedures for implementing the three alternative, multi-part management information systems developed in Section 3.

The great number of feasible alternatives makes superfluous the drafting of detailed implementation schedules. The following treatment is intended as a broad overview - a guide to drafting schedules for specific alternatives chosen after deliberation by representatives of all area agencies. An example of a more detailed schedule is the "proposal for a Logbook Pilot Study" (Appendix 6.5).

Implementation of the three sample systems is described - via Tables 10 and 11 - by system part - data collection, data reduction and storage and retrieval. Tables 10 and 11 suggest that, except for the Hawaiian troll log system, implementation of data collection parts of the system is possible by the beginning of month 7. Implementation of the Hawaiian troll log system is delayed - by a 6 month-pilot study - until the beginning of month 13.

Regardless of the specific system implemented, data reduction parts should be operational by the beginning of month 4. The single feasible storage and retrieval option considered should similarly be operational by the beginning of month 4.

Regardless of the specific system, the first two implementation activities are central planning, scheduled for two months for the three sample systems, followed by local, agency level planning. It is essential in a complicated multiple-agency cooperative endeavor such as the proposed information system, that comprehensive planning precede implementation activities. Central planning, involving technical representatives from the Council and the four data collecting agencies, should cover all aspects of system implementation, beginning with collection and reduction responsibilities, continuing through periodicity of data transmission to the central facility, and including central facilities and local agency needs for Council processed data.

Planning should also cover specific data items needed for the Council data base, details of preliminary surveys where needed to determine collection procedures, and possibly format standardization.

An option is for the Council's Scientific and Statistical Committee (SSC) to designate a special planning group to report preliminary conclusions for discussion at a regular SSC meeting. A second meeting might be required prior to the commencement of work on local and central portions of the system.

TABLE 10. Implementation schedule. Alternatives 1 and 2, Western Pacific Regional Fisheries Management Council Information Management System.1/

Activity	Month 1	2	3	4	5	6	7	8	9	10	11	12	13
Central planning	X	-	-	-	-	X							
Local planning	X	-	-	-	-	-	-	-	-	X			
Data collection													
American Samoa Troll-Log													
Procure forms			X	-	-	X							
Hire and train personnel			X	-	-	X							
Introduce				X	-	-	X						
Operational					X								
Guam Troll-Survey													
Procure forms			X	-	-	X							
Hire and train personnel			X	-	-	X							
Operational				X									
Hawaii 2/													
Fish ticket													
Procure forms			X	-	-	X							
Operational				X									
Longline-Log													
Procure forms			X	-	-	X							
Hire, train personnel			X	-	-	X							
Introduce				X	-	-	X						
Operational					X								
NW Bottomfish, Lobster-Log													
Procure forms			X	-	-	X							
Hire, train personnel			X	-	-	X							
Introduce				X	-	-	X						
Operational					X								
Troll-Log													
Pilot study			X	-	-	-	-	-	-	-	-	-	X
Procure forms									X	-	-	X	
Hire, train personnel									X	-	-	X	
Introduce										X	-	-	-
Operational													X

TABLE 10 (Cont.)

Activity	Month 1	2	3	4	5	6	7	8	9	10	11	12	13
Data collection													
Hawaii (Cont.)													
Tuna Handline-Survey													
Procure forms			X	--	X								
Hire, train personnel			X	--	X								
Operational				X									
Northern Marianas Troll-Log													
Procure forms			X	--	X								
Hire, train personnel			X	--	X								
Introduce				X	--	X							
Operational					X								
National Marine Fisheries Service Log[3/]													
Data reduction - All agencies													
Hire and train personnel			X	--	X								
Procure equipment			X	--	X								
Operational				X									
Storage and Retrieval													
Procure computer service			X										
Hire and train personnel	X	--	X	X	--	X							
Procure equipment				X	--	X							
Operational					X								

1/ System descriptions: See footnotes 6, 7 in Table 9.

2/ Established Hawaiian pole and line and precious coral fishery logs are deemed satisfactory. Thus, no implementation plan is needed.

3/ Implementation of the suggested log system to collect NMFS-collected foreign tuna longline, bottomfish and coral fishery data requires high level NMFS personnel time, as well as Department of State cooperation; a schedule is impossible to estimate.

TABLE 11. Implementation schedule, alternative 3, Western Pacific Regional Fisheries Management Council Information Management System.1/

Activity	Month 1	2	3	4	5	6	7	8	9	10	11	12	13
Central planning	X	---	---	---	--X								
Local planning	X	---	---	---	---	---	---	---	--X				
Data collection													
American Samoa Troll-Survey													
Procure forms			X	--X									
Hire and train personnel			X	--X									
Operational				X									
Guam Troll Voluntary Log-Survey													
Procure forms			X	--X									
Hire and train personnel			X	--X									
Introduce				X	--X								
Operational					X								
Hawaii													
Fish ticket													
Procure forms			X	--X									
Operational				X									
Longline-Survey													
Procure forms			X	--X									
Hire and train personnel			X	--X									
Operational				X									
NW Bottomfish, Lobster-Survey													
Procure forms			X	--X									
Hire and train personnel			X	--X									
Operational				X									
Troll-Log													
Pilot study			X	---	---	---	---	---	--X				
Procure forms									X	--X			
Hire and train personnel									X	--X			
Introduce										X	---	---	--X
Operational													X

TABLE 11 (Cont.)

Activity	Month 1	2	3	4	5	6	7	8	9	10	11	12	13
Data collection													
Hawaii (Cont.)													
Tuna Handline-Log													
Procure forms			X	--	X								
Hire and train personnel			X	--	X								
Introduce				X	----------		X						
Operational							X						
Northern Marianas Troll-Survey													
Procure forms			X	--	X								
Hire and train personnel			X	--	X								
Operational				X									
National Marine Fish. Serv.-Log 2/													
Data reduction - All agencies													
Hire, train personnel			X	--	X								
Procure equipment			X	--	X								
Operational				X									
Storage and retrieval													
Procure computer service			X										
Hire and train personnel		X	--	X	X	--	X						
Procure equipment					X	--	X						
Operational						X							

1/ System description: See footnote 8, Table 9.

2/ Implementation of the suggested log system collect NMFS-collected foreign fishery data is impossible to estimate.

FORMS

Figures 1, 2 and 3 are one possible set of effort, catch and biological sample data collection forms. These "universal" forms were not designed to satisfy specific data requirements of any particular western Pacific data collection agency, but rather to encompass all requirements of all agencies. The forms are adequate to collect data either as a log or by survey.

The effort form includes all data items necessary to calculate effort indices identified in Section 1 tables. Vessel-trips and angler-trips are not included, as these are results of analysis, not data. Neither number of gear sets nor number of successful sets are included; these are not strictly effort indices but more indices of school density, school size, fishermen skill, gear size, etc. All other desired effort indices identified in Section 1 either are included as to be collected data items, or can be calculated from included items.

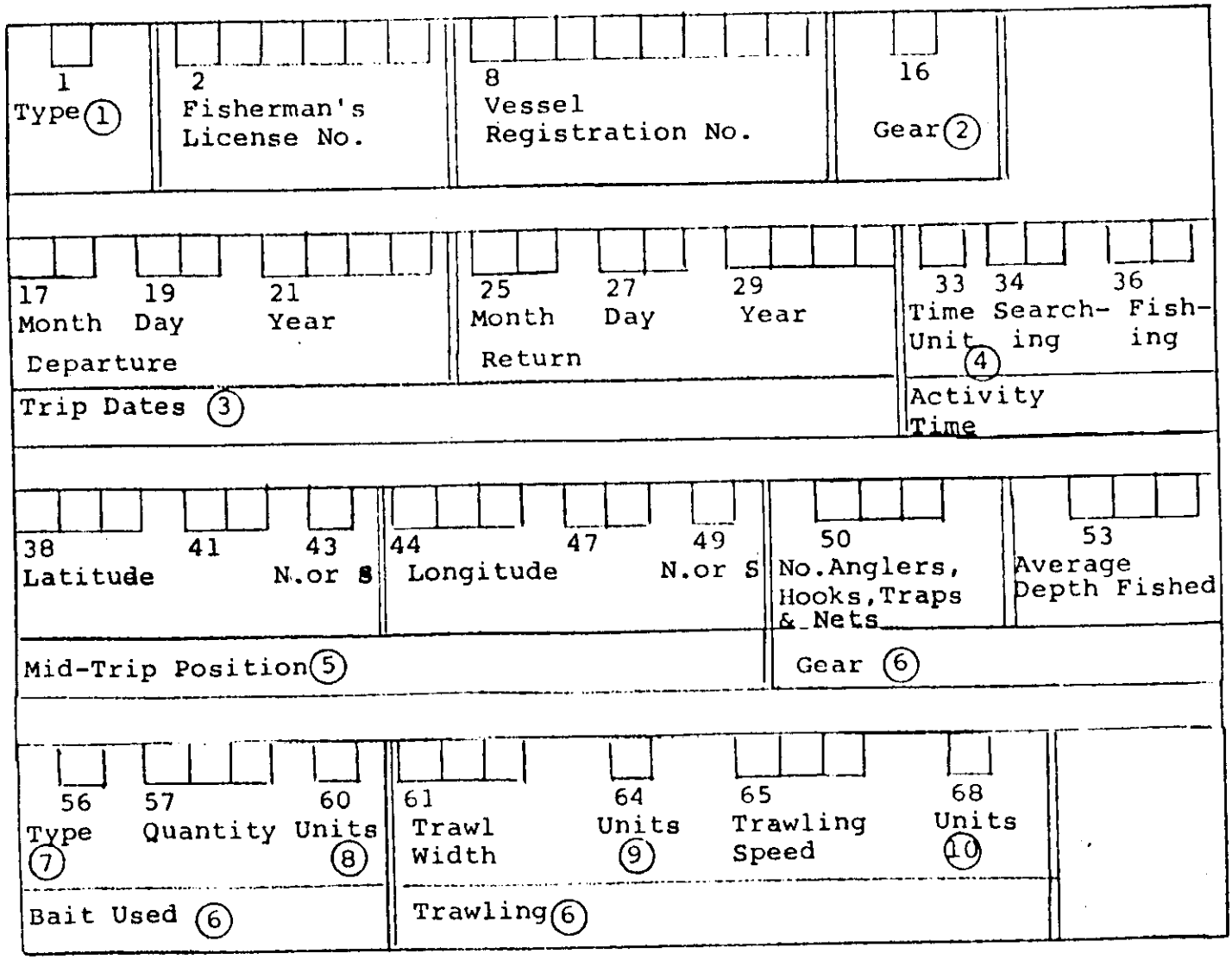
All catch indices identified in Section 1 tables either are included on one of the three forms or can be calculated from included items.

Biological data items on the biological data form are restricted to length, weight and sex, those items likely to be gatherable in the field. Additionally, a space is provided to indicate the taking of biological samples (e.g., otolith, stomach, scale) for subsequent laboratory analysis. Such samples can be uniquely identified by some combination of fishermen or vessel number, data and sample number.

Data in excess of that provided for on the forms - catch of more than five species, more than four biological samples - can be easily recorded by continuing onto additional forms. Duplicating items 1-39 on the catch form and items 1-28 on the biological sample form will uniquely identify the data.

In all cases, the collection forms are designed to facilitate direct entry onto electronic media (e.g. keypunch). To account for all standard media, an 80-column record size is used.

FIGURE 1. Effort data log/survey form.



1 Type: 1 = daily log; 2 = weekly log; 3 = monthly log; 4 = market survey; 5 = vessel survey.

2 Gear: 1 = baitboat; 2 = handline; 3 = longline; 4 = trap; 5 = trawl; 6 = troll; 7 = recreational hook and line.

3 For one day trip use departure date.

4 Time unit: H = hour; D = day; W = week.

5 Noon or middle day if trip greater than one day.

6 Fill-in if applies to particular fishery.

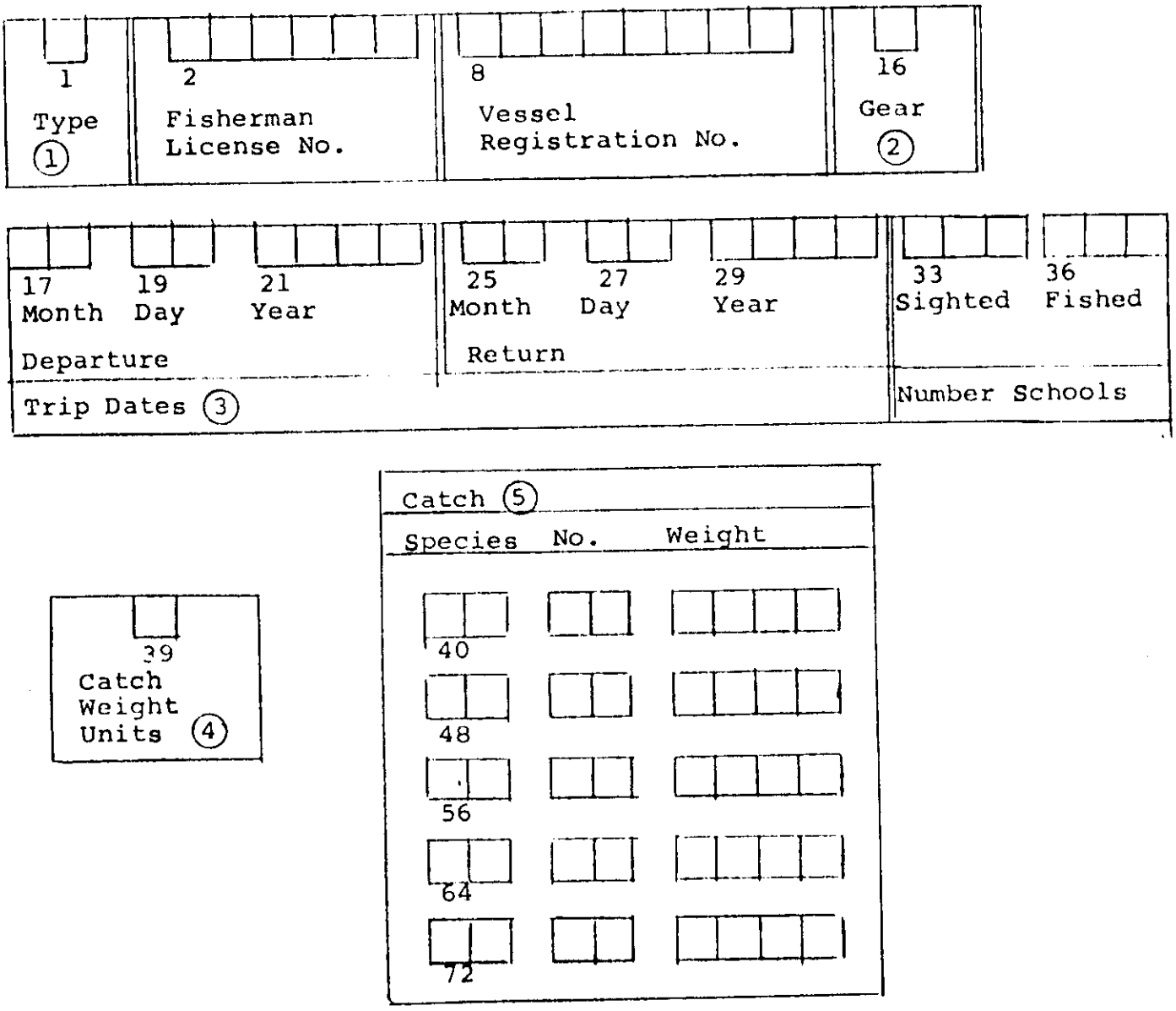
7 Bait type: 1 = anchovy; 2 = mollie; 3 = sardine.

8 Weight units: P = pounds; K = kilograms; 1 = 5 pound scoop; 2 = 10 pound scoop.

9 Trawl width units: F = feet; M = meters.

10 Trawl speed units: M = miles/hr.; K = knots/hr.

FIGURE 2. Catch data log/survey forms.



1 Type: 1 = daily log; 2 = weekly log; 3 = monthly log; 4 = market survey; 5 = vessel survey, etc.

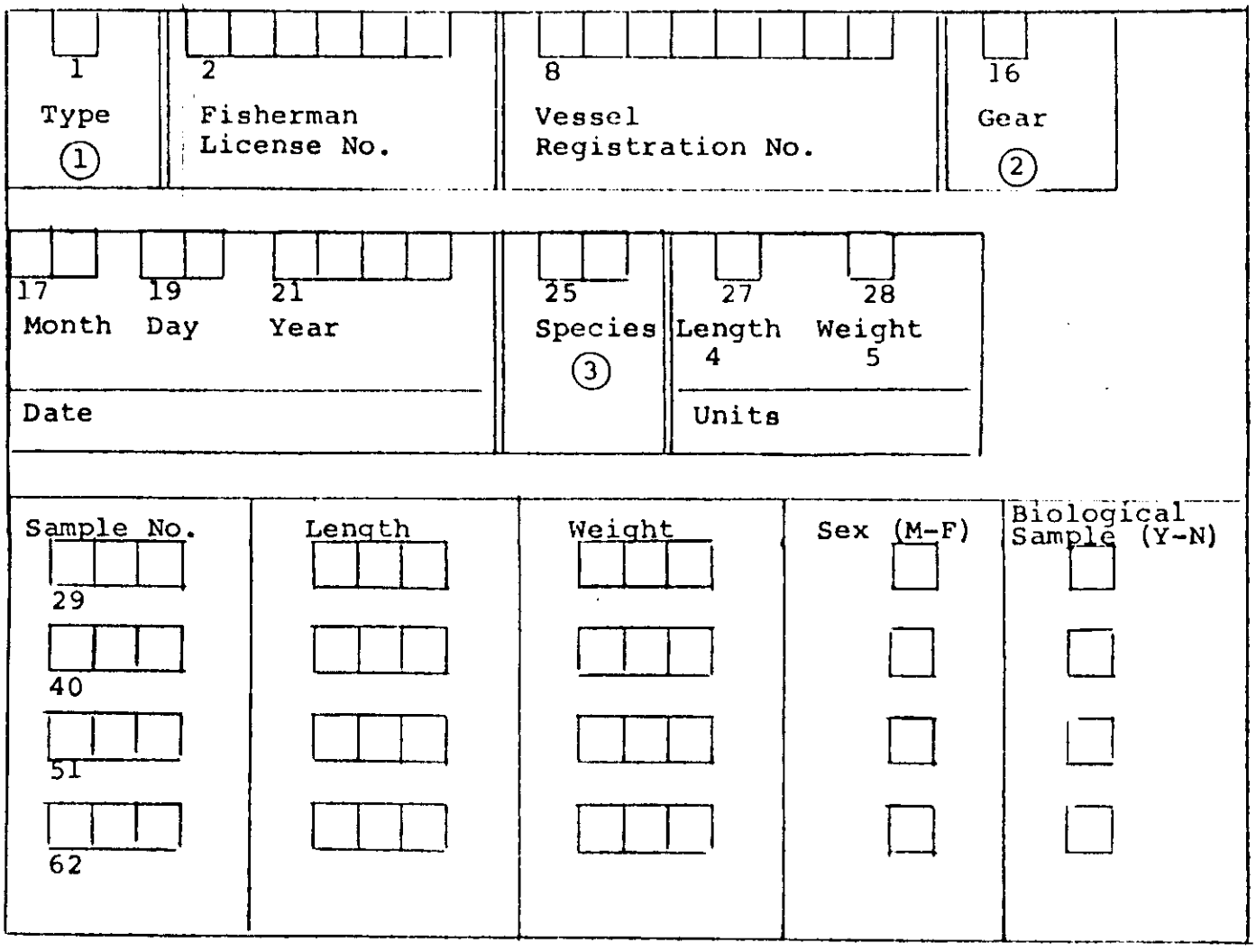
2 Gear: 1 = baitboat; 2 = handline; 3 = longline; 4 = trap; 5 = trawl; 6 = troll; 7 = recreational hook and line, etc.

3 For one day trip use departure date.

4 Catch weight units: P = pounds; K = kilograms; S = short tons; L = long tons; M = metric tons, etc.

5 Species: 01 = blue marlin, ... (a species list)

FIGURE 3. Sample biological sample data le survey form.



1 Type: 1 = daily log; 2 = weekly log; 3 = monthly log; 4 = market survey; 5 = vessel survey, etc.

2 Gear: 1 = baitboat; 2 = handline; 3 = longline; 4 = trap; 5 = trawl; 6 = troll; 7 = recreational hook and line, etc.

3 For one day trip use departure date.

4 Length units: M = millimeters; C = centimeters; N = meters; I = inches; F = feet, etc.

5 Weight units: G = grams; K = kilograms; P = pounds, etc.

5. SUMMARY AND CONCLUSIONS

This study began with a trip to interview agencies concerned with fishery catch and effort data collection and use in the Western Pacific Regional Fishery Management Council's area of interest - the American Samoa Office of Marine Resources, the Guam Aquatic and Wildlife Resources Division, the Hawaii Division of Fish and Game, the Northern Marianas Fishing Authority, the National Marine Fisheries Service - Honolulu Laboratory and the Council Executive Director's Office.

Results of the interview trip and of our assessment of western Pacific agency data needs, the degree to which current data collection activities satisfy needs and alternative formulations of a total management information system to satisfy Council needs are summarized as follows:

1. A total of 53 fisheries were identified in the five agency areas. Seventeen of these are of management interest to the Council (Table 2).

2. Council data needs are restricted to the following fisheries: troll, handline, pole and line and longline for billfish; handline, trap, line and trawl for bottomfish; traps for lobster; and submersible, trawl and hand gathering for precious coral (Table 4).

3. For data collection purposes, these fisheries are combined, when practical, within agency areas. For example, in American Samoa, the commercial/charter troll fishery is combined with the small boat troll fishery.

4. Collection systems, which can form the framework for a comprehensive Council system, exist in all areas. However, none of the present agency systems are adequate for Council needs and, in addition, the individual systems are not coordinated to provide a western Pacific management information system. Some catch data is being collected for all fisheries of interest to the Council. However, for many fisheries, there is no effort or inadequate effort being collected.

5. Recommended data collection systems fall into three general categories: vessel logbooks and/or periodic reporting by fishermen; periodic surveys and/or interviews with fishermen or dealers; and fish tickets completed by the first buyers to record the flow of fish through commercial channels. The merits and drawbacks of each system for each of the fishery area/units of concern were examined, then ranked according to cost and effectiveness (Table 8).

6. Data reduction alternatives considered included local agency reduction, central site reduction and combinations of local and central operations. The merits and drawbacks of each were

examined for each fishery/area unit, then ranked according to cost and effectiveness (Table 8).

7. Storage and retrieval systems were investigated. It is recommended that the central storage and retrieval system be located in Honolulu, utilizing the NMFS contract computer facilities (currently INFONET) at the NMFS Laboratory.

8. Three alternative Management Information Systems were developed by combining the alternative agency data collection and reduction methods.

9. The recommended system consists of the first ranked agency methods combined with a central storage and retrieval system based at NMFS Laboratory, Honolulu. The second and third alternative systems are variations of the recommended system.

10. The first ranked system is estimated to require the addition of 4.45 man-years' labor annually, allocated as follows: 1.65 man-years' labor to local agency staff for data collection; 1.10 man-years, divided between local agencies and the central site, for data reduction; and 1.70 man-years at the central site for storage and retrieval. The system requires the addition of the following data processing equipment: approximately 1.10 machine-years of data entry equipment, at both local and central sites, and 2.00 machine-years of file editing equipment located at the central site.

11. Systems could be operational within 12 months of introduction.

12. The needs of all area agencies for data collection forms can be met by three general forms - one each for effort, catch and biological data. Data can be entered (e.g. key punched) directly from these forms.

6. APPENDICES

6.1 FISHERY INFORMATION NEEDS - BY AGENCY

CONTENTS

6.1.1. INTRODUCTION

The first objective of this report is to identify fishery data needs of the six western Pacific agencies, in that area of the central and western Pacific within the jurisdiction of the Council.

The various users of fishery information in American Samoa, Guam, Hawaii and the Northern Mariana Islands were initially polled as to their institutional objectives and biological data needed to fulfill those objectives. Results are summarized in Table 1.

Institutional objectives, as well as specific informational needs, are examined in detail below for each agency in turn. Those agencies primarily responsible for the collection of basic data - i.e., all except the Council - are discussed first; the Council, which is chiefly concerned with conclusions and recommendations derived from the synthesis and analysis of the basic data, is covered last.

6.1.2. AMERICAN SAMOA OFFICE OF MARINE RESOURCES

Fishery data collection activities in American Samoa by the Office of Marine Resources (OMR) are funded through the Dingle-Johnson Act. In addition, statistical information on catches of foreign longline vessels delivering to the area needed by the National Marine Fisheries Service, Honolulu, is collected by the Office of Marine Resources.

American Samoa consists of seven islands: Tutuila; Annu'u; the Manua group of Ta'u, Olosega and Ofu; Swains and Rose. Tutuila, the largest, is surrounded by a narrow fringing reef which is heavily fished by subsistence and recreational fishermen. The offshore banks and the outer islands have greater fishing area but they lie a considerable distance from Tutuila and few local vessels are sufficiently seaworthy to fish these areas.

Thirty thousand of the 35,000 total population of the Islands is concentrated on Tutuila. Local wind and sea conditions prevent small craft from operating anywhere except close to Tutuila. Thus, with the exception of the offshore tuna fleet based in Pago Pago, which ranges the south central Pacific, the bulk of fishing activity in American Samoa is subsistence and recreational in character.

Tables 12 and 13 show in detail the various pieces of catch/effort data that could usefully be gathered to fully describe American Samoa fishing activities. Table entries indicate the effort and catch/landing data to be collected from each operating unit (or a sample of operating units), in each fishery. For each

table, a number entered for a fishery (row) indicates that the indicated data item (column) could be usefully collected for that fishery. Entries are coded to indicated desired collection or compilation periodicity. The precise meaning of each code number is provided in footnote 1 on Table 4. Further, entries for data items deemed essential by the agency (i.e., the Office of Marine Resources in Tables 12 and 13) are indicated by underlining. This scheme is followed in all catch/effort tables.

The first effort data item - "effort description" - in Table 12 (and in all subsequent effort data tables in the report) is descriptive and as noted, is to be collected "by periodic survey." After initial collection, by survey techniques, supplemental vessel registration or fisherman licensing schemes, this data should be updated periodically, as personnel monitoring the fishery become aware of changes in measured data. Data encompassed by "effort description" are defined in the footnote of Table 3. It should be noted, however, that data encompassed by this data item may differ slightly by area - that is, from agency to agency - depending on agency requirements and collection capabilities.

As entries in Tables 12 and 13 indicate, monthly collection or compilation of most data items should be sufficient to fulfill OMR requirements. The only exceptions are the "effort description" item as noted above. Due to the limited scope of local fishing activities in American Samoa, essential data needs do not present too formidable a collection task.

Foreign tuna longlining activities, although based in American Samoa, are not included in Tables 12 and 13. Biological data describing these activities are not needed by the Office of Marine Resources, as all fishing takes place well outside American Samoan waters; these data needs with respect to foreign tuna longlining activities are addressed below under these two agencies.

6.1.3. GUAM AQUATIC AND WILDLIFE RESOURCES DIVISION

The island of Guam lies 3,300 nautical miles west of Honolulu and 1,500 miles east of Manila. Encompassing a land area of 209 square miles, Guam is the largest island in the western Pacific between Hawaii and the Philippines. The island is geographically part of the Marianas Island chain, but has been politically separate since 1898, the end of the Spanish-American War. Total population in 1970 was 85,000 persons, but increases since the census have probably pushed the population level closer to 100,000. Inhabitants and development are concentrated on the southern two-thirds of the island, primarily along the western coast.

Table 12. Fishing effort data needs, American Samoa Office of Marine Resources. Entries reflect desired data collection periodicity[1]. Underlined entries are essential data.

Fishery	Effort description	No. fishermen (anglers)	No. vessel-trips	No. angler-trips	Days/hours absent	Days/hours searching	Days/hours fishing	Statistical area	Area fished (dragged, pond)	Depth gear set	No. hooks/traps/lines/nets	Bait type	Bait quantity used	No. gear sets	No. successful sets
	Effort Data														
Diving	7	4		4			4	4							
Handline															
Commercial	7		4				4	4			4				
Subsistence	7			4			4	4			4				
Shoreline															
Handpicking	7	4		4			4	4							
Hook and line	7	4		4			4	4							
Stationary nets, weirs	7						4								
Throw nets	7	4		4			4	4							
Traps	7						4	4		4	4	4			
Troll															
Commercial/charter	7		4				4	4			4				
Small boat	7			4			4	4			4				

1/ Symbols: See footnote 1, Table 4.

2/ "Effort description" encompasses such data as vessel/fishermen identification, vessel and fishermen numbers, vessel characteristics (owner's and captain's name, radio call sign, vessel length, beam, tonnage, engine size, fuel/bait/fish hold capacity, gear type and description, crew size, and port), other gear characteristics, port and landing/launching site characteristics, and possibly fishermen profile information.

Table 13. Fishery catch data needs, American Samoa Office of Marine Resources. Entries reflect desired data collection periodicity[1/] Underlined entries are essential data.

Fishery	Catch Data									
	No. schools sighted	No. schools fished	No. fish caught/landed	Wt. fish caught/landed	Statistical area of catch	Date/time of catch	Depth of catch	Species composition	Size composition (by species)	Sex composition (by species)
Diving			4		4	4		4		
Handline										
Commercial				4	4	4		4	4	
Subsistence			4		4	4		4		
Shoreline										
Handpicking			4		4	4		4		
Hook and line			4		4	4		4		
Stationary nets, weirs				4	4	4		4		
Throw nets				4	4	4		4		
Traps			4		4	4		4	4	
Troll										
Commercial/charter			4[2/]	4[3/]	4	4		4	4	
Small boat			4		4	4		4		

1/ Symbols: See footnote 1, Table 4.

2/ Charter.

3/ Commercial.

Aquatic and Wildlife Resources Division (AWR) data collection activities in Guam are funded largely by the Federal Government through the Dingell-Johnson Act under a project to "survey Guam's fish population and fishing methods." The objective of this project, as shown in Table 1, are to accumulate information necessary to formulate effective management programs for the Island's fishery resources.

Present fishing activities in Guam are dominated by recreational and subsistence elements, and are limited in scope and magnitude. Data needs, like those for American Samoa, are thus relatively basic, as shown in Tables 14 and 15. As entries in Tables 14 and 15 indicate, monthly collection or compilation of nearly all data items will suffice. The only exceptions are "effort description," for which only periodic survey is necessary.

6.1.4 HAWAII DIVISION OF FISH AND GAME

The State of Hawaii is a chain of 132 islands near the center of the north Pacific Ocean, about 2,400 miles from San Francisco. The chain extends 1,523 miles from the island of Hawaii in the southeast to Kure Island in the northwest, and may be divided into three groups: the sand and coral islands of the northwest; rock islets in the center; and the eight major islands at the southeast end. The eight major islands - Hawaii, Oahu, Maui, Kahoolawve, Lanai, Molokai, Kauai and Niihau - comprise all except three square miles of the entire land area (6,425 square miles) and account for almost all of the chain's 750 miles of coastline. Of the state's over 850,000 inhabitants, about 82 percent are concentrated in Oahu, followed by the island of Hawaii (8 percent), Maui (6 percent) and Kauai (4 percent).

The guiding mandates of the Hawaii Division of Fish and Game (HFG) are to manage and assist in the development of aquatic resources under State jurisdiction[1/]. In many ways, these objectives overlap, of course, but reliable information and data about past and present exploitive activities are a basic input to both intelligent management decisions and development planning.

Fishing activities in the Hawaiian islands are diverse - in the wide range of species taken and the variety of gear and techniques utilized - and at the same time, relatively small in scale, presenting a formidable data collection task. Tables 16 and 17 show in detail the various pieces of catch/effort data that could usefully be gathered to fully describe Hawaii's fishing activities.

1/ Seaward boundaries of State jurisdiction are not clearly defined - the issue is currently being argued legally.

Table 14. Fishing effort data needs, Guam Aquatic and Wildlife Resources Division. Entries reflect desired data collection periodicity.[1/] Underlined entries are essential data.

Fishery	Effort description	No. fishermen (anglers)	No. vessel-trips	No. angler-trips	Days/hours absent	Days/hours searching	Days/hours fishing	Statistical area	Area fished (dragged, pond)	Depth gear set	No. hooks/traps/lines/nets	Bait type	Bait quantity used	No. gear sets	No. successful sets
Inshore															
Handpicking and spear (diving)	7			4			4	4			4[2/]				
Hook and line	7			4			4	4							
Net	7			4			4	4							
Offshore															
Handline	7		4				4	4			4				
Spear (diving)	7	4		4			4	4							
Troll	7			4			4	4			4				
Ponds, weirs	6						4								

1/ Symbols: See footnote 1, Table 4.

2/ Gill net.

Table 15. Fishery catch needs, Guam Aquatic and Wildlife Resources Division. Entries reflect desired data collection periodicity.[1/] Underlined entries are essential data.

Fishery	Catch Data										
	No. schools sighted	No. schools fished	No. fish caught/landed	Wt. fish caught/landed	Statistical area of catch	Date/time of catch	Depth of catch	Species composition	Size composition(by species)	Sex composition(by species)
Inshore										
Handpicking and spear(diving)			4		4	4		4		
Hook and line			4		4	4		4		
Net				4	4	4		4		
Offshore										
Handline			4		4	4		4		
Spear (diving)			4		4	4		4		
Troll			4		4	4		4	4	4
Ponds, weirs				4		4		4		

1/ Symbols: See footnote 1, Table 4.

Table 16. Fishing effort data needs, Hawaii Division of Fish and Game. Entries reflect desired data collection periodicity.1/ Underlined entries are essential data.

Fishery	Effort description	No. fishermen (anglers)	No. vessel-trips	No. angler-trips	Days/hours absent	Days/hours searching	Days/hours fishing	Statistical area	Area fished (dragged, pond)	Depth gear set	No. hooks/traps/lines/nets	Bait type	Bait quantity used	No. gear sets	No. successful sets
	Effort Data														
Diving															
Aquarium	7	4		4			4	4							
Spear, gathering	7	4		4			4	4							
Handline															
Akule/opelu	7	4[2]	4[3]	4[2]			4	4							
Deepsea (bottomfish)	7			4[2]			4[3]	4		4[3]	4[3]				
Inshore (bottomfish)	7	4[2]		4			4	4			4				
Tuna	7		4				4	4		4	4				
Longline ("ahi")	7						1	1		1	1	1	1		
Net															
Akule	7					4[5]	4	4							
Bait 4/	7					4	4	4						4	4
Gill	7						4	4			4				
Tangle (crab)	7						4	4			4[3]				
Trawl	7						4	4	4						
Pole and line ("aku")	7					4	4	4			4	4	4		
Pond	7														
Precious coral	7	4[6]	4	4[6]			4	4							
Shoreline															
Handpicking	7	4		4			4	4							
Hook and line	7	4		4			4	4							
Throw nets	7	4		4			4	4							
Trap															
Bottomfish	7						4	4		4	4				
Crab	7						4	4			4				
Lobster	7						4	4		4	4	4			
Shrimp	7						4	4			4				
Troll															
Commercial/charter	7						4	4			4				
Small boat	7			4			4	4			4				

Table 16 (Cont.)

1/ Symbols: See footnote 1, Table 4.
2/ Recreational.
3/ Commercial.
4/ Mainly tuna pole and line vessels
5/ Including aerial search time.
6/ Divers only.

Table 17. Fishery catch data needs, Hawaii Division of Fish and Game. Entries reflect desired data collection periodicity.1/ Underlined entries are essential data.

Fishery	Catch Data									
	No. schools sighted	No. schools fished	No. fish caught/landed	Wt. fish caught/landed	Statistical area of catch	Date/time of catch	Depth of catch	Species composition	Size composition (by species)	Sex composition (by species)
Diving										
Aquarium			4		4	4		4		
Spear, gathering			4		4	4		4		
Handline										
Akule/opelu			4 2/	4 3/	4	4		4		
Deepsea (bottomfish)			4 2/	4 3/	4	4		4		
Inshore (bottomfish)			4		4	4		4		
Tuna			4		4	4		4	4	4
Longline ("ahi")			1	1	1	1	1	1	4	4
Net										
Akule	4	4		4	4	4		4		
Bait	4	4		4	4	4		4		
Gill				4	4	4		4		
Tangle (crab)			4	4	4	4		4		
Trawl				4	4	4		4		
Pole and line ("aku")	4	4		4	4	4		4	4	
Pond				4	4	4		4		
Precious coral				4	4	4		4		
Shoreline										
Handpicking			4		4	4		4		
Hook and line			4		4	4		4		
Throw nets				4	4	4		4		
Trap										
Bottomfish				4	4	4		4		
Crab				4	4	4		4		
Lobster			4	4	4	4		4	4	4
Shrimp				4	4	4		4		
Troll										
Commercial/charter			4	4	4	4		4	4 4/	4 4/
Small boat			4		4	4		4		

1/ Symbols: See footnote 1, Table 4.
2/ Recreational fishery only.
3/ Commercial fishery.
4/ Billfish only.

6.1.5. NORTHERN MARIANAS FISHING AUTHORITY

The Northern Mariana Islands consists of 13 single islands and one group (Maug Island) of three small islands which extend in a chain some 300 miles long, from Farallon de Pajaros in the north to Rota Island in the south. Total land surface is approximately 183 square miles, two-thirds of which is made up of the three principal islands: Saipan, Tinian and Rota. These islands also account for all but about 150 of the total population of approximately 15,000 persons; over 85 percent alone live on Saipan, the District Center. Saipan is the only island with a sizeable lagoon, which extends almost the entire length of the western side of the island. The bulk of Saipan's population is concentrated along the southwestern shore.

Government involvement in fishery matters is a relatively recent phenomenon in the Northern Marianas. Additionally, at the time of the field work, a complete restructuring of the government was under study in preparation for the impeding change in political status of the Islands. Consequently, government policy and goals - even the entity of the implementing agency - with respect to fishery data collection were in the process of reformulation during late 1977. Discussions with the principals in government concerned with fishery matters, however, indicated that fishery data are broadly conceived as needed for resource conservation purposes, for development planning, for regulatory purposes (aimed primarily at foreign fishing activity) and to provide a basis for the Fishing Authority (NMFA) or whatever agnecy supercedes it - to make informed decisions on fishermen loan requests.

Like Guam, fishing activities in the Northern Marianas are dominated by recreational and subsistence elements; activities, however, are even more limited in magnitude than in Guam. Data requirements are thus similarly basic, as indicated in Tables 18 and 19.

Table entries indicate the various catch and effort information required of operating units in each fishery. Catch/effort data is difficult and expensive to collect from recreational/subsistence fishermen; quarterly estimate of these data for inshore activities (which are dominated by the recreational/subsistence element), as well as for fish trap and weir operations, would suffice. Additionally, quarterly estimation of all effort data and most catch data for the small boat offshore fishery is adequate. Compilation of data relating to billfish catches in the offshore fishery would be desirable, however. Catch/effort information on the small commercial line fishery should also be collected monthly.

Essential data needs of the Fishing Authority are not great due to the limited scope and magnitude of current fishing activities in the Islands.

Table 18. Fishing effort data needs, Northern Marianas Fishing Authority. Entries reflect desired data collection periodicity.[1/] Underlined entries are essential data.

Fishery	Effort description	No. fishermen (anglers)	No. vessel-trips	No. angler-trips	Days/hours absent	Days/hours searching	Days/hours fishing	Statistical area	Area fished (dragged, pond)	Depth gear set	No. hooks/traps/lines/nets	Bait type	Bait quantity used	No. gear sets	No. successful sets
	Effort Data														
Commercial line	7						4	4			4				
Small scale															
Inshore	7			5			5	5							
Offshore	7			5			5	5			5				
Traps	7						5	5			5				
Weirs	7														

1/ Symbols: See footnote 1, Table 4.

Table 19. Fishery catch data needs, Northern Marianas Fishing Authority. Entries reflect desired data collection periodicity.1/ Underlined entries are essential data.

Fishery	Catch Data									
	No. schools sighted	No. schools fished	No. fish caught/landed	Wt. fish caught/landed	Statistical area of catch	Date/time of catch	Depth of catch	Species composition	Size composition(by species)	Sex composition(by species)
Commercial line				4	4	4		4		
Small scale										
Inshore			5		5	5		5		
Offshore			5		5	5		5		
Traps			5		5	5		5		
Weirs				5	5	5		5		

1/ Symbols: See footnote 1, Table 4.

6.1.6 NATIONAL MARINE FISHERIES SERVICE

The mandate of the National Marine Fisheries Service (NMFS), is a broad one, encompassing fishery resource research, utilization and management. NMFS is charged with carrying out basic and applied research which will support wise development and provide a basis for intelligent management decisions. The agency is also to assist industry and State/Commonwealth/Territory fishery agencies in their efforts to stimulate development and optimal commercial and recreational utilization of fishery resources. Under the Fisheries Conservation and Management Act of 1976, the NMFS was given the responsibility of assisting the regional management councils (set up under the Act) in the formulation of fishery management plans, as well as the task of implementing the finalized plans. The data needs of the Honolulu Laboratory thus relate primarily to research and management responsibilities.

Research and management interests of the Honolulu Laboratory currently focus on a few key fisheries and species of the region. Pelagics, especially tuna and billfish, are the prime species of interest to the Laboratory. Billfish information requirements, however, relate primarily to support of the Council management responsibilities, and are thus identified and discussed under that agency. Similarly, Northwest Hawaiian lobster and bottomfish data needs, while of importance to NMFS, relate primarily to the Council and HF&G jurisdictional responsibilities and are consequently examined under those agencies. NMFS data requirements for tuna fisheries, both domestic and foreign, are specified in detail in Tables 20 and 21. as are data needs in the foreign precious coral and bottomfish fisheries. The latter two fisheries, while part of the management responsibilities of the Council, are clearly within the mandate of NMFS to collect foreign fishery data.

As indicated in the following tables, the bulk of catch/effort information on domestic tuna fisheries is desired "by trip." Monthly collection or compilation of the appropriate foreign fishery data is adequate.

Table 20. Fishing effort data needs, National Marine Fisheries Service, Honolulu Laboratory. Entries reflect desired data collection periodicity.1/ Underlined entries are essential data.

Fishery	Effort description	No. fishermen (anglers)	No. vessel-trips	No. angler-trips	Days/hours absent	Days/hours searching	Days/hours fishing	Statistical area	Area fished(dragged,pond)	Depth gear set	No.hooks/traps/lines/nets	Bait type	Bait quantity used	No. gear sets	No. successful sets
	Effort Data														
Domestic Tuna2/															
Pole and line	7				1	1	1	1			1	1	1		
Purse seine	7				1	1		1						1	1
Troll	7						1	1			1				
Foreign															
Bottomfish															
Line	7						4	4			4				
Trawl	7						4	4	4	4					
Precious coral	7						4	4	4						
Tuna pole and line	7					4	4	4			4				
Tuna longline	7						4	4		4	4				

1/ Symbols: See footnote 1, Table 4.

2/ Domestic tuna vessels fishing in central or western Pacific on which statistics are not collected by State/Commonwealth/Territorial agencies.

Table 21. Fishery catch data needs, National Marine Fisheries Service, Honolulu Laboratory. Entries reflect desired data collection periodicity.1/ Underlined entries are essential data.

Fishery	Catch Data									
	No. schools sighted	No. schools fished	No. fish caught/landed	Wt. fish caught/landed	Statistical area of catch	Date/time of catch	Depth of catch	Species composition	Size composition (by species)	Sex composition (by species)
Domestic tuna										
Pole and line	1	1		1	1	1		1	4	
Purse seine	1	1		1	1	1		1	4	
Troll				1	1	1		1	4	
Foreign										
Bottomfish										
Line				4	4	4		4		
Trawl				4	4	4		4		
Precious coral				4	4	4		4		
Tuna pole and line	4	4		4	4	4		4		
Tuna longline			4	4	4	4		4	4	4

1/ Symbols: See footnote 1, Table 4.

6.2 COMPARISON OF INFORMATION NEEDS AND CURRENT COLLECTION ACTIVITIES - BY AGENCY

CONTENTS

6.2.1. INTRODUCTION

The second objective of this report is to compare fishery information needs to data presently produced by existing fishery data collection systems in the region in order to identify areas where data availability falls short of information requirements. Data collection is described for all fisheries whether or not individual fisheries are those for which the Council needs data (focus fisheries).

Each agency is again examined in turn, utilizing the same matrix format presented in Appendix 6.1. As in Tables 12-21, an entry in a column indicates that information could be usefully collected for the fishery represented by the row; for data deemed essential, entries are again underlined. Entry coding, however, differs.

Instead of periodicity, entries indicate the degree to which information needs - as specified in the appropriate table in Appendix 6.2 - are fulfilled by current data collection activities. Footnote 1 of Table 6 provides a precise definition of the entry code. In many cases, however, the degree to which needs are satisfied cannot be neatly quantified because, for example, the complexity of data needs and present collection realities, or a lack of sufficient knowledge about current data collection techniques. The adequacy and shortcomings of currently available data and collection systems for these cases are discussed in the accompanying narrative.

6.2.2 AMERICAN SAMOA OFFICE OF MARINE RESOURCES

Tables 22 and 23 compare present OMR fishery data collection activities with information requirements defined in Appendix 6.1. Only activities of direct interest to the Office, i.e., those related to local American Samoa fisheries, are addressed here. The adequacy of the data collection system for the foreign long-line fishery, for which catch and effort information are of prime interest to the NMFS and Council, is addressed below (in this section) under those agencies; this system is funded and directed by NMFS.

A fish ticket system has been introduced to obtain information on the catches of trollers, handliners and longliners delivered to the Tutuila market. The lack of information on the proportion of total catches in fisheries covered by the current system is reflected in the "S" entries on Table 23 for line and troll fisheries. Additionally, for some fisheries, the species composition of deliveries to the market is unclear.

Table 22. Degree to which effort data needs of the American Samoa Office of Marine Resources (Table 13) are satisfied. Entries reflect the degree to which current collection activities satisfy needs.1/ Underlined entries are essential data.

	Effort Data														
Fishery	Effort description	No. fishermen (anglers)	No. vessel-trips	No. angler-trips	Days/hours absent	Days/hours searching	Days/hours fishing	Statistical area	Area fished (dragged, pond)	Depth gear set	No. hooks/traps/lines/nets	Bait type	Bait quantity used	No. gear sets	No. successful sets
Diving	S	S		N											
Line															
Commercial	S		S				S	N			N				
Subsistence	S			N			N	N			N				
Shoreline															
Handpicking	S	2		N			S	2							
Hook and line	S	2		N			S	2							
Stationary nets, weirs	N						N								
Throw nets	S	2		N			S	2							
Traps	N						N	N		N	N	N			
Troll															
Commercial/charter	S		N				N	N			N				
Small boat	S			N			N	N			N				

1/ Symbols: See footnote 1, Table 6.

Table 23. Degree to which catch data needs of the American Samoa Office of Marine Resources (Table 14) are satisfied. Entries reflect the degree to which current collection activities satisfy needs.1/ Underlined entries are essential data.

Fishery	Catch Data									
	No. schools sighted	No. schools fished	No. fish caught/landed	Wt. fish caught/landed	Statistical area of catch	Date/time of catch	Depth of catch	Species composition	Size composition (by species)	Sex composition (by species)
Diving			S		N	N		N		
Line										
Commercial				S	S	S		S	N	
Subsistence			N		N	S		S		
Shoreline										
Handpicking			2		2	2		2		
Hook and line			2		2	2		2		
Stationary nets, weirs				S	S	S		S		
Throw nets				2	2	2		2		
Traps			N		N	N		N	N	
Troll										
Commercial/charter			2	2	N	2		2	N	
Small boat			S		S	S		S		

1/ Symbols: See footnote 1, Table 6.

Data describing fishing effort and areas of capture are not currently collected. However, some data on "effort description" is yielded by the Coast Guard boat registration program covering vesels over five tons gross weight.

Data describing catch and effort in both small craft sport troll and small trap fisheries are presently not collected.

For the shore subsistence fisheries, considerable information has been obtained on total effort and catch through twice-weekly surveys from the road system of Tutuila. These surveys, due to budget and personnel limitations, do not yield certain essential effort data - such as "number of angler trips," and produce only broadly descriptive data on and partial coverage of other elements of catch and effort. Handpicking, pole and line, throw net and diving activity on the other islands and parts of Tutuila are not covered by present data collection activities.

Stationary nets and weirs, another shoreline activity associated with village fisheries, have not yet been surveyed.

In summary, data collection coverage of the major local fishing operations remains incomplete, but has improved significantly in the recent past; coverage of the more difficult inshore subsistence activities is still poor.

6.2.3 GUAM AQUATIC AND WILDLIFE RESOURCES DIVISION

Tables 24 and 25 compare present AWR fishery data collection activities in Guam with information requirements formulated for the Island in Appendix 6.1.

Guam Department of Public Safety registration requirements (for all powered vessels over ten horsepower) provide a fragmentary picture of fishing vessel numbers in Guam. Registration information, however, does not indicate vessel use; the precise number of registered fishing vessels is thus far not known. Additionally, an unkown number of trailered power vessels, as well as all unpowered vessels, go unregistered. Registration appears to be a one-time requirement (for each owner); annual changes must be estimated. Registration information provides the bulk, but not all, of needed vessel data for the larger (moored) vessels.

As there are presently only two ports where vessels may be moored, AWR Division personnel are able to keep fairly close tabs on the numbers of moored fishing vessels by port, as well as get a good idea of the numbers of the most active trailered fishing vessels.

Table 24. Degree to which effort data needs of the Guam Aquatic and Wildlife Resources Division (Table 15) are satisfied. Entries reflect the degree to which current collection activities satisfy needs.1/ Underlined entries are essential data.

	Effort Data														
Fishery	Effort description	No. fishermen (anglers)	No. vessel-trips	No. angler-trips	Days/hours absent	Days/hours searching	Days/hours fishing	Statistical area	Area fished (dragged, pond)	Depth gear set	No. hooks/traps/lines/nets	Bait type	Bait quantity used	No. gear sets	No. successful sets
Inshore															
Handpicking and spear (diving)	S			4			3	3							
Hook and line	S			4			4	4							
Net	S			4			4	3			4 2/				
Offshore															
Handline	S		2				2	2			2				
Spear (diving)	S	2		2			2	2							
Troll	S			2			2	2			2				
Ponds, weirs	S						N								

1/ Entry Symbols: See Footnote 1, Table 6.

2/ Gill nets only.

Table 25. Degree to which catch data needs of the Guam Aquatic and Wildlife Resources Division (Table 16) are satisfied. Entries reflect the degree to which current collection activities satisfy needs.1/ Underlined entries are essential data.

	Catch Data									
Fishery	No. schools sighted	No. schools fished	No. fish caught/landed	Wt. fish caught/landed	Statistical area of catch	Date/time of catch	Depth of catch	Species composition	Size composition (by species)	Sex composition (by species)
Inshore										
Handpicking and spear (diving)			3		3	3		2		
Hook and line			4		4	4		2		
Net				3	3	3		2		
Offshore										
Handline			2	2	2	2		2		
Spear (diving)			2		2	2		2		
Troll			2		2	2		2	U	U
Ponds, weirs				4		4		4		

1/ Entry Symbols: See Footnote 1, Table 6.

As there is no requirement for the licensing of fishermen, their exact numbers are unknown. Estimates are made monthly of the numbers of participants for each gear type, as part of regular monthly creel censuses (see below); these estimates do not account for double counting, however. Some other basic effort description data are also provided by the creel censuses.

Inshore fishing activities are surveyed by a two-day-per-month creel census (interview) by Division personnel; offshore activities are covered by a four-day-per-month survey (interview) at Agana Boat Basin. The resulting data is analyzed, producing monthly effort estimates by gear type, as well as monthly catch estimates by major species. A voluntary daily catch record (essentially a log), to be sumbitted by cooperating offshore fishermen, is planned.

The chief shortcoming of the system is that activities are surveyed on only two (inshore) or four (offshore) days a month. This sample size may not be sufficient to assure acceptable accuracy of estimates. Additionally, coverage is not consistent for all fisheries. Of the two boat basins and the five or six other launch sites, only Agana Basin is surveyed (covering an estimated 50 percent of offshore activity).

Coverage of inshore spear fishing and handpicking activities is weakest, as these fishermen are not as accessible to interviewers as other inshore fishermen. Data describing gill netting effort in more detail (set duration, number of nets and depth of set) is not collected.

Data collection activities with respect to fish weir operations yield information on the number, location and size of each weir and catches by species, but no data describing fishing time.

Present survey techniques yield estimates of a large portion of required catch/landing information. As mentioned previously, the chief shortcoming is that a reliable species breakdown of catches is not available for inshore activity due mainly to problems with species identification by survey personnel - except in the seasonal net fishery for rabbitfish (siganids); additionally, current estimates of catch volumes are thought to be suspect due to problems in converting fish numbers to weights. Difficulties in sampling inshore handpickers and spear fishermen appear to indicate catch estimates for this activity are less reliable than for other inshore activities.

Present survey techniques utilized in the offshore fishery cover only a portion of these activities (those out of Agana Boat Basin). The resulting monthly estimates of catch volume, by gear type, thus fall short of needs in coverage. Information on catch-by-species, area of catch and size by species is also collected during the regular surveys of Agana Boat Basin, but survey techniques must be improved (and coverage expanded) before these data will fulfill needs.

6.2.4 HAWAII DIVISION OF FISH AND GAME

Tables 26 and 27 compare present catch/effort data collection activities in the Hawaiian Islands with information requirements as formulated in Appendix 6.1. While a sophisticated data collection system is operated by HF&G to collect much biological data on commercial catches - i.e., those catches which are sold by the fishermen - there is no system to collect similar information on recreational/subsistence activities on a regular basis. Recreational/subsistence activities clearly dominate shoreline, spear and troll fishing activities, and are a major element in most other activities. Only pole and line, coral, aquarium, deepsea handline, longline, ika-sibi, bait, akule net, trawl and selected trap fisheries are clearly dominated by commercial interests. With few exceptions, however, Hawaiian fisheries are a mixture of commercial, recreational and subsistence elements.

Commercial fishermen are required to be licensed and submit monthly reports on effort and catches associated with their commercial activities. However, while fishermen in certain key fisheries, such as the inshore handline, troll and handpicking and gathering fisheries, hold fishing licenses and regularly submit monthly fish catch reports to HF&G reporting on their commercial activity, reported effort and catch/landing information are thought to cover only a small portion of total effort expended and catches. These complexities make tabular evaluation of current data collection activities and quantification of the degree to which identified needs are satisfied by current collection activities quite difficult. Consequently, Tables 26 and 27 represent primarily an evaluation of current data collection activities relative to commercial activities.

Data availability for those clearly commercial fisheries is best. Specialized, separate monthly report forms are utilized in pole and line, longline, baitfish, aquarium and pond fisheries. The entries in Tables 26 and 27 clearly reflect the degree to which effort and catch/landing data needs are met in each of these fisheries. The solitary large-scale precious coral harvester in the Islands reports required information to NMFS and HF&G on a confidential basis. The remainder of the commercially oriented fisheries, tuna handline, deepsea handline, trawl, akule net, NW lobster, bottomfish and shrimp trap - report effort and catches monthly on a generalized Fish Catch Report form. In the deepsea handline and NW lobster fisheries, "S" entries reflect the fact that data gathered on a trip basis are collected only for some trips (on a sampling basis by NMFS).

The charter troll, akule/oeplu handline, crab tangle net and bottomfish trap fisheries all embrace sizeable commercial and recreational/subsistence elements. Only catch/effort data where catches are sold are reported. This incompleteness of coverage is reflected in the "S" entries for data requirements in these fisheries.

Table 26. Degree to which effort data needs of the Hawaii Division of Fish and Game (Table 17) are satisfied. Entries reflect the degree to which current collection activities satisfy needs. 1/ Underlined entries are essential data.2/

	Effort Data														
Fishery	Effort description	No. fishermen (anglers)	No. vessel-trips	No. angler-trips	Days/hours absent	Days/hours searching	Days/hours fishing	Statistical area	Area fished(dragged,pond)	Depth gear set	No.hooks/traps/lines/nets	Bait type	Bait quantity used	No. gear sets	No. successful sets
Diving															
Aquarium	S	S		N			5	N							
Spear, gathering	S			N			S	N							
Handline															
Akule/opelu	S	N 4/	N 3/	N 4/			S	N			N 3/				
Deepsea (bottomfish)	S			N 4/			S 3/	N		S 3/	S 3/				
Inshore (bottomfish)	S	N 4/		N			N	N			N				
Tuna	S		5				5	N		N	N				
Longline ("ahi")	S						N	N		N	S	5	5		
Net															
Akule	S					N	S	N							
Bait	N					N	5	5						N	N
Gill	N						N	S			N 3/				
Tangle (crab)	S						S	S			N 3/				
Trawl	S						S	N	N						
Pole and line ("aku")	S					N	5	N			S	5	5		
Pond	4														
Precious coral	5	N 5/	5 6/	N 5/			5 6/	5 6/							
Shoreline															
Handpicking	N	N		N			S	S							
Hook and line	N	N		N			N	N							
Throw nets	N	N		N			N	N							
Trap															
Bottomfish	S						S	N		S	S				
Crab	S						S	S			N				N
Lobster	S						S	N		S	S	S			
Shrimp	S						N	N			N				
Troll															
Commercial charter	S						S	S			N				
Small boat	S			S			S	S			N				

1/ Symbols: See footnote 1, Table 6.
2/ This table evaluates primarily current data collection activities relati to commercial activities - i.e. those in which catches are sold; there i presently no system to collect data on recreational and subsistence fish activities on a regular basis. See text.
3/ Commercial.
4/ Recreational.
5/ Divers only.
6/ Large scale commercial operation only.

Table 27. Degree to which catch data needs of the Hawaii Division of Fish and Game (Table 18) are satisfied. Entries reflect the degree to which current collection activities satisfy needs.1/ Underlined entries are essential data.2/

Fishery	Catch Data: No. schools sighted	No. schools fished	No. fish caught/landed	Wt. fish caught/landed	Statistical area of catch	Date/time of catch	Depth of catch	Species composition	Size composition (by species)	Sex composition (by species)
Diving										
Aquarium			5		5	5		5		
Spear, gathering			S		S	S		S		
Handline										
Akule/opelu			N	S	S	S		S		
Deepsea (bottomfish)			N	3	3	3		3		
Inshore (bottomfish)			S		S	S		S		
Tuna			4		4	4		4	N	N
Longline ("ahi")			S	4	4	4	N	4	N	N
Net										
Akule	N	N		4	4	4		4		
Bait	N	N		5	5	5		5		
Gill				S	S	S		S		
Tangle (crab)			N	4	4	4		4		
Trawl				5	5	5		5		
Pole and line ("aku")	N	N		5	4	5		5	N	
Pond				5	5	5		5		
Precious coral				5	5	5		5		
Shoreline										
Handpicking			S		S	S		S		
Pole and line			N		N	N		N		
Throw nets				N	N	N		N		
Trap										
Bottomfish				4	4	4		4		
Crab				4	4	4		4		
Lobster			S	4	4	4		4	S	S
Shrimp				4	4	4		4		
Troll										
Commercial/charter			S	S	S	S		S	N	N
Small boat			S	S	S	S		S		

1/ Symbols: See footnote 1, Table 6.

While many effort and catch data needs of commercial fisheries are indicated as essentially fulfilled ("5" entries) by the present collection system, without exception quality problems exist with all presently available data which cannot be evaluated within the context of Tables 28 and 29. These problems relate to non-fulfillment by fishermen of reporting (for example "area fished"), poorly filled out forms (some fishermen do not have a good command of the English language) and timeliness.

6.2.5. NORTHERN MARIANAS FISHING AUTHORITY

Tables 28 and 29 compare present NMFA fisheries data collection activities with information requirements as forumlated in Appendix 6.1.

A beginning has been made in collecting fishermen and vessel numbers; fishermen cooperative records (the co-op is managed by the Fishing Authority) yield these data for co-op members and for fishermen selling catches through the co-op retail outlet. Numbers of non-co-op fishermen and recreational/subsistence fishermen are unknown as no fishermen are licensed in the Islands. Vessel registration requirements of the Port Director of Saipan yield data on powered vessels; however, not all powered vessels are in fact registered, and no registration requirements exist for non-powered vessels. Numbers in this latter group are thus unknown. Registration requirements also yield the bulk of required vessel data (length, horsepower, etc.), but only for these vessels currently registered.

Little data are presently collected describing inshore catches - these activities are almost exclusively recreational/subsistence in character. Although a permit system exists for fish weir (trap) operators, no catch data are apparently gathered on these facilities. Limited data are available on the volume and distribution of offshore catches through co-op records (most co-op members utilize boats, and are thus assumed to be primarily offshore fishermen). A monthly survey of fish retail outlets by the Fishing Authority Manager yields a monthly estimate of fish catches reaching commercial channels, as well as some information on fish distribution (almost all local catches that reach commercial channels go to the fresh market); the bulk of fish reaching commercial channels are thought to be of offshore origin, but some fish trap production and catches in the commercial line fishery also reach local commercial channels.

Operators of the one-two commercial line vessels fishing out of Saipan report their catches - by major species group - to the Fishing Authority Manager monthly. Volume of these catches exported - by major species group - are also reported.

Thus, an impressive beginning has been made by the Fishing Authority in collecting useful catch/landing information, but improvements are still required, as indicated in Table 29. The more difficult effort information remains largely uncollected to date (Table 28).

Table 28. Degree to which effort data needs of the Northern Marianas Fishing Authority (Table 19) are satisfied. Entries reflect the degree to which current collection activities satisfy needs.1/ Underlined entries are essential data.

	Effort Data														
Fishery	Effort description 2/	No. fishermen (anglers)	No. vessel-trips	No. angler-trips	Days/hours absent	Days/hours searching	Days/hours fishing	Statistical area	Area fished (dragged, pond)	Depth gear set	No. hooks/traps/lines/nets	Bait type	Bait quantity used	No. gear sets	No. successful sets
Commercial line	S						N	N			N				
Small scale															
Inshore	N			N			N	N							
Offshore	S			N			N	N			N				
Traps	N						N	N			N				
Weirs	S														

1/ Symbols: See footnote 1, Table 6.

Table 29. Degree to which catch data needs of the Northern Marianas Fishing Authority (Table 20) are satisfied. Entries reflect the degree to which current collection activities satisfy needs.1/ Underlined entries are essential data.

	Catch Data									
Fishery	No. schools sighted	No. schools fished	No. fish caught/landed	Wt. fish caught/landed	Statistical area of catch	Date/time of catch	Depth of catch	Species composition	Size composition(by species)	Sex composition(by species)
Commercial line				S	N	S		S		
Small scale										
Inshore			S		N	S		S		
Offshore			S		N	S		S		
Traps			S		N	S		S		
Weirs				N	N	N		N		

1/ Symbols: See footnote 1, Table 6.

6.2.6 NATIONAL MARINE FISHERIES SERVICE

Tables 30 and 31 compare NMFS data collection activities with information requirements as listed in Appendix 6.1.

NMFS data requirements relative to domestic tuna baitboat and longline activity are largely filled, with the exception of several key data items. Requirements for domestic tuna purse seine and troll fisheries, as indicated, are for the most part, unsatisfied. (Purse seine data needs relate to the growing number of United States vessels, almost always home ported outside the region, which are fishing the central and western Pacific and occasionally call or unload at American Samoa and Hawaii.)

With respect to foreign fishing activity, the NMFS has prime responsibility for data collection. As indicated in the tables, data presently available describing these activities are meager, with the exception of information collected on foreign longline activity centered in American Samoa. All data on other foreign fishing activity in the contract region presently do not fulfill requirements. What data are available - with the exception of American Samoa activity - become accessible only after considerable lag time.

Table 30. Degree to which effort data needs of the National Marine Fisheries Service, Honolulu Laboratory (Table 21) are satisfied. Entries reflect the degree to which current collection activities satisfy needs.1/ Underlined entries are essential data.

	Effort Data															
Fishery	Effort description 2/	No. fishermen (anglers)	No. vessel-trips	No. angler-trips	Days/hours absent	Days/hours searching	Days/hours fishing	Statistical area	Area fished (dragged, pond)	Depth gear set	No. hooks/traps/lines/nets	Bait type	Bait quantity used	No. gear sets	No. successful sets
Domestic tuna 2/															
Pole and line	U				U	U	U	U			U	U	U		
Purse seine	U				U	U		U						U	U
Troll	U						U	U			U				
Foreign															
Bottomfish															
Line	N						N	N			N				
Trawl	N						N	N	N	N					
Precious coral	N						N	N	N						
Tuna longline	4						4	4		N	4				
Tuna pole and line	N					N	N	N			N				

1/ Symbols: See footnote 1, Table 6.

2/ See Footnote 3, Table 10. There have been occasional exploratory fishin ventures into the area but no permanent fishery and no permanent data collection system established. Any data collection is *ad hoc*, hence the "U" entries.

Table 31. Degree to which catch data needs of the National Marine Fisheries Service, Honolulu Laboratory (Table 22) are satisfied. Entries reflect the degree to which current collection activities satisfy needs.1/ Underlined entries are essential data.

Fishery	Catch Data									
	No. schools sighted	No. schools fished	No. fish caught/landed	Wt. fish caught/landed	Statistical area of catch	Date/time of catch	Depth of catch	Species composition	Size composition (by species)	Sex composition (by species)
Domestic tuna										
Pole and line	U	U		U	U	U		U	U	
Purse seine	U	U		U	U	U		U	U	
Troll				U	U	U		U	U	
Foreign										
Bottomfish										
Line				N	N	N		N		
Trawl				N	N	N		N		
Precious coral				N	N	N		N		
Tuna pole and line	N	N		N	N	N		N		
Tuna longline			4	4	4	4		4	S	S

1/ Symbols: See footnote 1, Table 6.

6.3 ALTERNATIVE MANAGEMENT INFORMATION SYSTEMS - BY AGENCY

CONTENTS

6.3.1 INTRODUCTION

The third objective of this report is to develop alternative Council-oriented management information systems defined in Section 3 as composed of three parts - data collection, data reduction and storage and retrieval.

Alternative ways of collecting and reducing data are developed below for each agency and summarized in Section 3. Storage and retrieval options are discussed in Section 3.

After system part alternatives are developed, benefits and costs of alternatives are discussed and ranked according to least cost. Both quantitative and non-quantifiable, qualitative features of proposed alternatives are contrasted in order to rank alternatives for each system component.

Quantitative features include man-years and machine-years necessary to implement an alternative. For purposes of comparison, it is assumed that the dollar-cost of a man-year of labor of a particular type is equivalent in all areas discussed, similarly the dollar-cost of a machine-year of equivalent pieces of equipment. Additionally, it is assumed that all costs accrue to the Council.

Non-quantifiable or qualitative features include such considerations as political and physical feasibility and compatibility of proposed alternatives with existing activities.

Where possible, alternative assessments for each system part are summarized in a ranked list. This quantitative ranking is modified, as appropriate, by qualitative considerations. The results of ranking are summarized in Section 3.

6.3.2 DATA COLLECTION - BY AGENCY

6.3.2.1 AMERICAN SAMOA OFFICE OF MARINE RESOURCES

The only local fisheries of concern to the Council are the troll fisheries. Samoan troll fisheries are prosecuted by a handful of boats fishing mostly from Pago Pago Harbor and are of Council interest because of the small catches of billfish[1/]. The few commercial/charter trollers land more billfish than the smaller trollers, as they range farther and can handle larger fish. Of the few billfish landed, most do not enter commercial channels but are retained by fishermen.

1/ Several other species are grouped under "billfish" for Council purposes: wahoo, mahimahi and pelagic sharks.

Coast Guard vessel documentation yields limited "effort description" information. There is no logbook collection system focused on Samoan troll fisheries. A fish ticket system is operative at one market on Tutuila and yields information on billfish, wahoo and mahimahi landings when those species go through that particular market.

Tables 32 and 33 indicate catch and effort data requirements of both the Council and the Office of Marine Resources (OMR), with respect to the Samoan troll fisheries. Entries reflect the specific data items desired, their priority and necessary collection periodicity. Council requirements pertain only to billfish catch and effort. OMR needs, on the other hand, relate to catch and effort associated with the fishery as a whole. Table entries indicate other constrasts in Council and OMR data needs, but only the differences in priority attached to certain data items are likely to cause any conflicts between Council and OMR requirements.

As indicated in the tables, Council needs are not fulfilled by the existing American Samoa data collection activities.

Approaches to upgrading the present system are:

A LOGBOOK SYSTEM

A permanent logbook would be produced and distributed among troller fishermen by an OMR staff member responsible for the program. Program objectives and information requirements would be explained to fishermen when logs were distributed. Twice monthly the OMR staff member would circulate among fishermen to extract information from completed logs, obtain missing data by interview and offer advice on improving future logbook entries. Logbook collection procedures would have to be based on a voluntary compliance, as fishermen are not licensed in American Samoa. Due to the small number of trollers and their concentration at Pago Pago, such a system would require only .15 man-years of OMR staff time yearly.

SURVEY/INTERVIEW SYSTEM

The required information on billfish activity by local trollers could also be gathered by survey techniques. The small number of boats, concentrated at Pago Pago, should enable an OMR biologist to interview all troll fishermen once a week at a cost of only .25 man-years per year. Little additional time would probably be needed to concurrently gather information on offshore fishing activity.

FISH TICKET SYSTEM

Troll billfish catches are quite small, and few are sold by fishermen; most are retained because of the recreational nature of the fishery. Therefore, a fish ticket system will not generate the required information on catch.

Table 32. Western Pacific Regional Fishery Management Council and Samoa effort data needs and the degree to which current Samoa collection fulfills Council needs. 1/

Fishery	Effort Data														
	Effort description	No. fishermen (anglers)	No. vessel-trips	No. angler-trips	Days/hours absent	Days/hours searching	Days/hours fishing	Statistical area	Area fished (dragged, pond)	Depth gear set	No. hooks/traps/lines/nets	Bait type	Bait quantity used	No. gear sets	No. successful sets
Commercial/charter troll															
WPRFMC needs	7					4	4				4				
Samoa needs	7		4			4	4				4				
Degree of satisfaction	S					N	N				N				
Small boat troll															
WPRFMC needs	7			4		4	4				4				
Samoa needs	7			4		4	4				4				
Degree of satisfaction	S			N		N	N				N				

1/ Symbols:
Needs: See footnote 1, Table 4.
Satisfaction: See footnote 1, Table 6.

Table 33. WPRFMC and Samoa catch data needs and the degree to which current Samoa collection fulfills Council needs. 1/

Fishery	Catch Data									
	No. schools sighted	No. schools fished	No. fish caught/landed	Wt. fish caught/landed	Statistical area of catch	Date/time of catch	Depth of catch	Species composition	Size composition (by species)	Sex composition (by species)
Billfish										
Commercial/charter troll										
WPRFMC needs			4		4	4		4	4	
Samoa needs			4 2/	4 3/	4	4		4	4	
Degree of satisfaction			S		N	S		S	N	
Small boat troll										
WPRFMC needs			4		4	4		4		
Samoa needs			4		4	4		4		
Degree of satisfaction			S		S	S		S		

1/ See footnote 1, Table 32

2/ Charter

3/ Commercial

RANKED DATA COLLECTION TECHNIQUES

A fish ticket system to gather Council-needed data on American Samoa troll fisheries is impractical.

Both log and survey systems to gather data on the small Pago Pago troll fleet are feasible; the log would require approximately .15 man-year's labor annually, the survey .25 man-years. Additionally, implementation of the log system would require approximately .05 man-years of OMR staff time to explain procedures.

The log system is ranked first, the survey approach second.

6.3.2.2. GUAM AQUATIC AND WILDLIFE RESOURCES DIVISION

Only the troll fishery operating out of Guam is of management concern to the Council - specifically, the catch and effort in that fishery associated with billfish. This fishery is prosecuted by small vessels - most under 30 feet - the bulk of which, because of the limited moorage on the Island, are launched each fishing trip from one of the three harbors or five principal launch sites. The precise number of vessels participating in the fishery is not known. However, the Aquatic and Wildlife Resources Division (AWRD) estimates that during the period July, 1977-June, 1978, an average of 20 offshore fishing boat trips were made daily from all Island harbors and launch sites; about half of all offshore trips are thought to originate and conclude at Agana Boat Basin. AWRD data reveal that virtually all billfish catches by troll fishermen during 1977-1978 were made during the months of April, May and June.

While commercial and charter activities are an element in the Guam troll fishery, clearly most fishing is for recreational and subsistence purposes. This is especially true with regard to billfish, where recreational fishermen dominate. This, coupled with the lack of an organized or centralized fish market in Guam, results in few billfish reaching commercial channels.

Billfish catch/effort data are currently produced by the AWRD, the Guam Department of Public Safety and the United States Coast Guard. The system is based on a four-day-per-month survey by a Division biologist of Agana Boat Basin, where all fishing parties are interviewed either upon departure or return. Detailed catch and effort data are gathered through these interviews (an interview form is shown in Appendix 6.4). The other harbors or launch sites on the Island presently are not surveyed. Additionally, an aerial survey is accomplished two days each month during which the number of vessels by gear type is tabulated and fishing area noted (Appendix 6). Certain "effort description" data are yielded

by the Department of Public Safety vessel registration system and Coast Guard vessel documentation requirements.

Tables 34 and 35 indicate catch and effort data requirements of both the Council and the AWRD for the small boat troll fishery. Entries reflect the specific data items desired, their priority and the necessary periodicity of collection. Council requirements pertain only to billfish catch and effort in the troll fishery. AWRD needs relate to catch and effort associated with the fishery as a whole. The bulk of AWRD-needed data items are required on a monthly basis. Currently collection systems fulfill about 50 percent of Council requirements for nearly all items. "Effort description" needs of the Council are met by the combination of AWRD, Department of Public Safety and Coast Guard survey and vessel registration and documentation activities. The "2" entries in Tables 34 and 35 reflect that AWRD surveys presently cover only Agana Boat Basin. According to AWRD estimates, about half of offshore fishing trips - the bulk of which are accounted for by trollers - are made from Agana Boat Basin. While providing most required "effort description" data, the combined activities of AWRD, Department of Public Safety and the Coast Guard do not provide information on vessel and gear characteristics and fishermen profiles.

Approaches to upgrading the system are:

A LOGBOOK SYSTEM

A permanent logbook would be produced and distributed among the troll fishermen. The system would be voluntary unless a licensing system was authorized by the Legislature. Guam officials indicate that such action is feasible. The fishermen, through the major sports fishing organizations on Guam, have indicated they will cooperate in a voluntary system.

Logbooks would be designed and placed on each vessel by AWRD personnel or by AWRD through the fishermen's organizations. Both techniques are probably necessary since not all billfish fishermen are members of an Island fisherman organization, and the number of members relative to the total number of active billfish fishermen is unknown.

A voluntary logbook system is estimated to annually require one man-year's labor spent interacting with the fishermen and their organizations and in editing the data obtained.

SURVEY/INTERVIEW SYSTEM

An expanded survey system would mesh well with the existing offshore fishing survey. Basically, the same techniques and procedures now utilized should be expanded to cover those harbors and launch sites not presently surveyed. Survey coverage of Agana Boat Basin,

Table 34. Western Pacific Regional Fishery Management Council and Guam effort data needs and the degree to which current Guam collection fulfills Council needs.1/

Fishery	Effort Data														
	Effort description 2/	No. fishermen (anglers)	No. vessel-trips	No. angler-trips	Days/hours absent	Days/hours searching	Days/hours fishing	Statistical area	Area fished (dragged, pond)	Depth gear set	No. hooks/traps/lines/nets	Bait type	Bait quantity used	No. gear sets	No. successful sets
Billfish															
Small boat troll															
WPRFMC needs	7			4		4	4				4				
Guam AWR needs	7			4		4	4				4				
Degree of satisfaction	S			2		2	2				2				

1/ Symbols:
Needs: See footnote 1, Table 4.
Satisfaction: See footnote 1, Table 6.

Table 35. Western Pacific Regional Fishery Management Council and Guam catch data needs and the degree to which current Guam collection fulfills Council needs. 1/

Fishery	Catch Data									
	No. schools sighted	No. schools fished	No. fish caught/landed	Wt. fish caught/landed	Statistical area of catch	Date/time of catch	Depth of catch	Species composition	Size composition (by species)	Sex composition (by species)
Billfish										
Small boat troll										
WPRFMC needs			4		4	4		4		
Guam AWR needs			4		4	4		4	4	4
Degree of satisfaction			2		2	2		2		

1/ See footnote 1, Table 34

the principal fishing harbor from which 40 percent of the offshore effort is estimated to originate, could remain at four days per month. The other seven major harbor/launch sites - accounting for nearly all the remaining effort - could be surveyed four days (sites and days chosen randomly) per month.

The enhanced survey alternative would involve primarily an increase in AWRD personnel time devoted to surveying and interviewing, and assumes a dependence on these methods as the principal source of the required data. About .8 man-year would be required annually, or twice the level currently required to survey Agana.

A FISH TICKET SYSTEM

Use of a fish ticket system to collect billfish data presents serious problems because:

1. Catches of billfish are small (estimated at less than 1,500 kg. during June, 1977-July, 1978) and are made in a three-month period.

2. Relatively little of these catches enter commercial channels because of the chiefly recreational orientation of the fishermen.

3. There is no centralized fish auction/market and sales are made by individual fishermen to numerous small retail outlets, restaurants and hotels.

For these reasons, a fish ticket system to collect billfish data in Guam is impractical.

COMBINED LOGBOOK AND SURVEY SYSTEM

A further alternative is a combination logbook survey method. In addition to the logbook system described previously, AWRD personnel would survey harbors and launch sites several times per month to check on the logbook system and to gather biological data. The present .4 man-year's annual effort would be continued to supplement the logbook efforts.

RANKED DATA COLLECTION TECHNIQUES

As discussed, a fish ticket system to gather data on Council-needed Guam fisheries is impractical.

Two alternative survey systems were developed: one continues and augments the current survey; the second, a reduced survey, complements a log system.

The system designed to augment the existing, well-run system by increasing survey coverage to presently unsurveyed segments of the fishery, is estimated to require the addition of .3 man-year's

labor annually over that currently eexpended, for a total of .7.

Qualitatively, an enhanced survey has the advantage of an existing, efficiently-run base. Additionally, this option requires little participation by fishermen or attendant AWRD public relations effort and no political action.

The second survey alternative is intended to supplement a log system; the annual labor requirement is estimated at .2 man-years.

Summarizing the costs, both quantitative and qualitative, of alternative Guam data collection schemes, the following results are yielded:

Alternative	Net* Cost Man-Years	Qualitative Consideration	Ranking
Enhanced survey	.3	No senior time, no political decision. Backup survey.	1
Log	.6	No backup survey.	3
Logbook with reduced survey	.8	Backup survey.	2

*Current activities replaced by these alternatives will yield approximately .4 man-years of biologist time assume applied to the alternatives.

In computing the net cost of implementing collection alternatives, the estimated .4 man-year's cost of the current survey system is assumed available for proposed alternatives.

The voluntrary log/reduced survey combination is ranked above the voluntary log alone, since the value of a backup survey augmenting the log outweighs its slight additional cost.

6.3.2.3. HAWAII DIVISION OF FISH AND GAME

As shown in Tables 36 and 37, Hawaii-based fisheries exploiting billfish, precious coral, lobster and bottomfish, are of management concern to the Council. For the latter two species, however, only Northwest Hawaii stocks have been targeted for Council attention.

Several Hawaiian fisheries take billfish as a principal or incidental catch: longline ("ahi"), pole and line ("aku"), handline

Table 36. Western Pacific Regional Fishery Management Council and Hawaii effort data needs and the degree to which current Hawaii collection fulfills Council need. 1/

Fishery	Effort description	No. fishermen (anglers)	No. vessel-trips	No. angler-trips	Days/hours absent	Days/hours searching	Days/hours fishing	Statistical area	Area fished (dragged, pond)	Depth gear set	No. hooks/traps/lines/nets	Bait type	Bait quantity used	No. gear sets	No. successful sets
	Effort Data														
Billfish															
Commercial/charter troll															
WPRFMC needs	7						4	4			4				
Hawaii DFG needs	7						4	4			4				
Degree of satisfaction	S						S	S			N				
Small boat troll															
WPRFMC needs	7			4			4	4			4				
Hawaii DFG needs	7			4			4	4			4				
Degree of satisfaction	S			S			S	S			N				
Tuna handline															
WPRFMC needs	7		4				4	4			4				
Hawaii DFG needs	7		4				4	4		4	4				
Degree of satisfaction	S		5				5	N		N	N				
Tuna longline															
WPRFMC needs	7						4	4			4				
Hawaii DFG needs	7						1	1		1	1	1	1		
Degree of satisfaction	S						N	N			S				
Tuna pole and line															
WPRFMC needs	7						4	4			4				
Hawaii DFG needs	7					4	4	4			4	4	4		
Degree of satisfaction	S					N	5	N			5	5	5		
Bottomfish															
NW Hawaiian handline															
WPRFMC needs	7						4	4			4				
Hawaii DFG needs	7			4			4	4		4	4				
Degree of satisfaction	S			N			S	N			S				
NW Hawaiian trap															
WPRFMC needs	7						4	4			4				
Hawaii DFG needs	7						4	4		4	4				
Degree of satisfaction	S						S	N			S				

Table 36 (Cont.)

Fishery	Effort description	No. fishermen (anglers)	No. vessel-trips	No. angler-trips	Days/hours absent	Days/hours searching	Days/hours fishing	Statistical area	Area fished (dragged, pond)	Depth gear set	No. hooks/traps/lines/nets	Bait type	Bait quantity used	No. gear sets	No. successful sets
	Effort Data														
NW Hawaiian lobster										1/					
WPRFMC needs	7						4	4			4				
Hawaii DFG needs	7						4	4		4	4	4			
Degree of satisfaction	S						S	N			S				
Precious coral															
WPRFMC needs	7		4				4	4							
Hawaii DFG needs	7		4				4	4							
Degree of satisfaction	5		5				5	5							

1/ Symbols
Needs: See footnote 1, Table 4.
Satisfaction: See footnote 1, Table 6.

Table 37. Western Pacific Regional Fishery Management Council and Hawaii catch data needs and the degree to which current Hawaii collection fulfills Council needs. 1/

Fishery	Catch Data									
	No. schools sighted	No. schools fished	No. fish caught/landed	Wt. fish caught/landed	Statistical area of catch	Date/time of catch	Depth of catch	Species composition	Size composition(by species)	Sex composition(by species)
Billfish										
Commercial/charter troll										
WPRFMC needs			4		4	4		4	4	
Hawaii DFG needs				4	4	4		4	4	4
Degree of satisfaction			S		S	S		S	N	
Small boat troll										
WPRFMC needs			4		4	4		4		
Hawaii DFG needs			4		4	4		4		
Degree of satisfaction			S		S	S		S		
Tuna handline										
WPRFMC needs			4		4	4		4	4	
Hawaii DFG needs			4		4	4		4	4	4
Degree of satisfaction					4	4		4	N	
Tuna longline										
WPRFMC needs			4		4	4		4	4	
Hawaii DFG needs			1	1	1	1	1	1	4	4
Degree of satisfaction			S		4	4		4	N	
Tuna pole and line										
WPRFMC needs				4	4	4		4		
Hawaii DFG needs	4	4		4	4	4		4	4	
Degree of satisfaction				5	4	5		5		
Bottomfish										
NW Hawaiian handline										
WPRFMC needs				4	4	4		4		
Hawaii DFG needs			4	4	4	4		4		
Degree of satisfaction			N	3	3	3		3		
NW Hawaiian trap										
WPRFMC needs				4	4	4		4		
Hawaii DFG needs				4	4	4		4		
Degree of satisfaction				4	4	4		4		

Table 37 (Cont.)

Fishery	Catch Data										
	No. schools sighted	No. schools fished	No. fish caught/landed	Wt. fish caught/landed	Statistical area of catch	Date/time of catch	Depth of catch	Species composition	Size composition (by species)	Sex composition (by species)
NW Hawaiian lobster										
WPRFMC needs			4	4	4	4		4	4	
Hawaii DFG needs			4	4	4	4		4	4	4
Degree of satisfaction			5	4	4	4		4	5	
Precious coral										
WPRFMC needs				4	4	4		4		
Hawaii DFG needs				4	4	4		4		
Degree of satisfaction				5	5	5		5		

1/ See footnote 1, Table 36

and troll fisheries. About 18 longliners operate out of Hawaii, approximately 14 vessels based at Kewalo Basin and Honolulu Harbor on Oahu, and about 4 at Napoopoo and Kawaihae on the island of Hawaii. These vessels fish primarily for tunas, but catch billfish, wahoo and mahimahi incidentally. The bulk of incidental catches are marketed through the Honolulu auction market, and secondarily the Hilo auction.

The pole and line fishery is included under "billfish" because of the incidental take of wahoo and mahimahi by the 14-15 vessels comprising this fishery. About 12 vessels fish out of Kewalo Basin, 2 are based on Maui (Kahului or Maalaea) and 1 on the Island of Hawaii (at Kawaihae). The bulk of incidental wahoo and mahimahi catches are marketed through the Honolulu auction, but small volumes reach the fresh fish markets on Maui and Hawaii.

The handline fishery exploits primarily tunas, but incidentally catches billfish. Over 40 small vessels prosecute this fishery, nearly all fishing out of ports and ramps on the Island of Hawaii. Most production is marketed through the Hilo auction.

Troll gear accounts for a substantial volume of Hawaii landings of billfish, wahoo and mahimahi. This fishery is conveniently divided into two segments: (1) the larger vessels - dominated by sports charter and commercial interest; and (2) smaller boats (the "mosquito fleet") dominated by recreational/subsistence elements. There are about 70 larger vessels, based primarily at Kewalo Basin and the Kona Coast (Hawaii), but also on Maui (Maalaea, Lahaina) and a few other harbors. The precise number of small trollers is unknown, but over 10,000 land-stored vessels - many no doubt utilized at least occasionally for trolling - were registered in the State in 1976. Small volumes of the trollers' outputs are marketed through auction markets, but the bulk is thought to go to small retail outlets, independent fish dealers or is retained by recreational and subsistence fishermen.

One commercial operator, utilizing a submersible, fishes out of Oahu for pink and gold coral. However, numerous small operators using diving techniqeus fish commercially and recreationally for black coral. Most catches are sold directly to jewelry manufacturers.

Northwestern Hawaiian Island lobster is currently trapped by a handful of vessels fishing out of Honolulu. Nearly all catches are marketed through the Honolulu auction market and several Oahu independent retailers.

Northwestern Hawaiian Island bottomfish is exploited by three to four vessels fishing out of Honolulu. Both handlines and traps are utilized. Vessels fishing the area sometimes fish for both lobster and bottomfish. Bottomfish catches are marketed through the Honolulu auction and independent dealers.

Slightly different techniques are presently utilized to collect descriptive data on each of the fisheries described above. With one exception, however, report forms submitted monthly to HF&G by fishermen on commercial[1/] activity account for all data gathered on these fisheries; an observer program administered by NMFS produces additional information on NWHI lobster and bottomfish operations.

Specialized pole and line and longline fishery logbook forms are submitted monthly to HF&G by fishermen (or their agents). These forms (shown in Appendix 6.4) have been developed over a number of years and yield a considerable amount of catch and effort data.

In all the other fisheries except the one large-scale precious coral operation, commercial fishermen are required to submit a monthly Fish Catch Report form detailing catch, economic and limited effort information. An example of this form is provided in Appendix 6.4.

Recreational troll and precious coral fisherman are not required to report their activities. The NMFS observer produces detailed data - concentrated on effort and biological - on selected NWHI lobster and bottomfish operations; samples of report forms utilized are shown in Appendix 6.4.

The one large-scale precious coral fishing operation is required to submit monthly to both HF&G and NMFS data on species harvested, wet weight, area nad depth of harvest, date of harvest and fishing time. These data must be documented in daily logbooks.

Certain "effort description" information on the above fisheries is yielded by the Hawaii Department of Transportation and Coast Guard vessel registration and documentation requirements. Samples of these forms are shown in Appendix 6.4.

As indicated in Table 37, Council requirements for catch data on the Hawaiian-based fisheries of concern are largely satisfied by current data collection activities of HF&G. Exceptions are the troll fisheries taking billfish, where sizeable non-commercial catches are not reported. Additionally, commercial catches in these fisheries are believed to be under-reported. Council required catch size composition data in selected fisheries either are not collected (billfish) or collected to an inadequate degree (lobster).

1/ Only data on commercial - i.e. when product is sold - catches are required; recreational/subsistence activities need not be reported.

Present HF&G effort data collection satisfies Council needs only for the submersible precious coral fishery (Table 36). For other fisheries of Council concern, many data items are either not currently collected, or current collection only partially fulfills Council needs.

Approaches to upgrading the system are complex because of the number of fisheries involved (nine) and the fact that different data collection problems are presented by the different fisheries, depending on the collection method addressed. To avoid repetition, rather than exploring fishery-by-fishery each of the collection alternatives, a slightly different approach is taken.

A LOGBOOK SYSTEM

The pole and line fishery is of concern to the Council because of the small incidental catches of mahimahi and wahoo. These species are of secondary importance to the Council and the current quasi-logbook system provides sufficient information for Council needs. No further efforts are deemed to be justified.

The longline fishery lends itself to extensive data collection through an improved logbook system based on the presently required logbook-type monthly report. Information requested by the current forms could be expanded and modified to meet Council needs. To minimize time required for log completion - an important factor in Hawaii - it is recommended logs take the form of simple multi-copy forms, to be completed by fishermen at the end of each fishing trip. Logbook completion and submission would continue as part of the licensing procedure. Log forms could be issued to fishermen yearly with the licenses. Submission of one copy of each of the completed forms would be by mail and through the longline fishermen's organization with some personal follow-up by a HF&G representative. A copy could be retained by the fisherman or the fisherman's organization for their records. The system would require .20 man-years annually for fishermen contact to insure data quality.

A logbook system for the Northwestern Hawaii lobster (trap) and bottomfish (trap and handline) fisheries would follow the pattern suggested for the longline fishery. The major difference is that reporting requirements and procedures would be based on the techniques presently utilized in this fishery - the Fish Catch Report - not those in the longline fishery. Approximately .10 man-years per year of HF&G personnel time would be required to keep the system running smoothly, producing the desired information.

Logbook techniques are difficult to apply to the tuna handline fishery due to the large number of vessels, their small size, and the short duration of trips (less than 24 hours). The system could be employed, however, along the same lines as utilized in the longline, lobster and bottomfish fisheries (see above). Different log collection methods would have to be utilized because of the small

size and dispersion of tuna handliners. In order to collect completed logs, an HF&G technician would have to circulate regularly among fishermen at the Hilo auction, other marketing points and at the ports on Hawaii. It is estimated that about .5 man-years per year would be required for this activity.

A logbook system for the large- and small-scale troll fisheries would be voluntary because of the important and sizeable recreational element in these fisheries.

It is recommended that the steps outlined in NMFS' "Proposal for a Logbook Pilot Study" (Appendix 6.5) be utilized. This approach will require about 2.15 man-years of personnel time over an eight-month period. This study would determine the response of recreational fishermen to a voluntary logbook system, the sample size necessary for adequate coverage and the personnel time required for implementation and maintenance of an ongoing system. If results were encouraging, steps could be taken to actually implement a full-scale system. The present logbook and reporting requirements in the single large-scale coral fishery fully satisfies Council data needs in this fishery; alternative approaches to collecting data on this operator will not be discussed. The precious coral divers could be incorporated in the pilot logbook system for the troll fisheries at almost no additional cost (Appendix 6.5).

SURVEY/INTERVIEW SYSTEM

The longline fishery data can be obtained using survey/interview methods. However, because of the small number of boats, their longer trips and irregular trip schedules, the surveyor would have to keep in close contact with the fishermen and their representative in the longliner's organization. The surveyor would then be alerted to visit the vessels as they were reported in port. Approximately .35 man-years per year would be required to collect the necessary data through interviewing of fishermen.

The large number of vessels in the troll fisheries and the scores of landing/launching sites, preclude the use of interview/survey techniques on a continuing basis. A sample interview system could be undertaken but in our opinion, the only practical method of obtaining the appropriate information is via a logbook system as described previously.

For the numerous divers harvesting black coral for both commercial and recreational purposes, a survey approach to gathering the necessary information faces prohibitive costs for the same reasons outlined for the troll fisheries above.

A FISH TICKET SYSTEM

If initiated, a fish ticket system should cover all species entering commercial channels. A system designed to collect data on just billfish, mahimahi, wahoo, lobster and precious coral, would be impractical. The system, if initiated, should cover all buyers and all species entering commercial channels. Such a system would logically replace the present Fish Dealer's Report System. It would take one man-year initially to establish the identity and addresses of all buyers, to explain the system and distribute the ticket forms.

After introduction, 1.5-2.0 man-years per year would be required to follow-up system introduction and keep it operating smoothly. However, if the fish ticket system supplants the present Fish Dealer's Report System, Enforcement Division personnel time now devoted to supporting this system could be shifted to support of the new system and would not represent any increase in Enforcement Division personnel time. Equipment (essentially one automobile on each of the islands of Oahu, Hawaii, Maui and Kaui) could also be transferred to support the new system.

The fish ticket approach is not practical for the Hawaiian troll fisheries as a major portion of catches do not enter commercial channels.

RANKED DATA COLLECTION TECHNIQUES

The current quasi-fish ticket system used to enforce licensing requirements could be modified slightly to collect improved catch and some effort data. Essentially, this is a no-cost operation, since most of the appropriate markets are already covered and the principal changes would be to modify the collection forms.

Log and survey collection alternatives are assessed for each fishery in turn.

Based on the discussion of Section 3 data on the pole and line fishery, catch and effort directed at Council species is adequately covered and no alternatives are proposed.

Logbook coverage of the longline fleet is estimated to cost .2 man-year's labor annually; survey coverage .35 man-years.

Northwestern Hawaii lobster and bottomfish fisheries could be covered by a log system at a cost of .1 man-year's time or by survey at a cost of .2 man-years annually.

Tuna handline fishery data collection could be accomplished by log (.5 man-year's time) or survey (.4 man-years annually).

As noted in Section 3, NMFS proposed feasibility study of coverage of the troll fishery by a voluntary log system is recommended. Data collection of this extensive fishery by survey/ interview would be prohibitively expensive.

The above information is summarized in the following table contrasting costs for data collection alternatives:

	Log			Survey		
Fishery	Cost	Qualitative Assessment	Rank	Cost	Qualitative Assessment	Rank
Longline	.20	None	1	.35	None	2
NW bottomfish and lobster	.10	None	1	.20	None	2
Pole and line	Current log adequate					
Troll	Currently planned voluntary log is only feasible alternative					
Tuna handline	.50	None	2	.40	None	1

6.3.2.4. NORTHERN MARIANAS FISHING AUTHORITY

Only the troll fishery operating out of the Northern Marianas is of concern to the Council. This fishery produces only an occasional billfish (number unknown) and is prosecuted almost exclusively from small outboard-powered boats.

In 1977, only 97 vessels were registered (only powered vessels are required to be registered) in the Islands, 78 of them on Saipan. A total of 103 fiserhmen were members of the fishermen's cooperative in that year, 58 on Saipan. Offshore fishermen (those with powered vessels) most commonly use troll gear. All but a handful of the fishing vessels in the Northern Marianas are trailered and launched from one of about five ramps on Saipan and one or two ramps on each of Rota and Tinian Islands. A small harbor exists on both Saipan and Tinian Islands.

While part-time commercial operators are present in the fishery, the bulk of offshore fishing is done for recreational and subsistence purposes. This fact, combined with the small catches and the still developing marketing system in the Islands, results in very few billfish reaching normal commercial channels.

Limited data on billfish catches are obtained through fishermen's fish catch reports to the fishermen's cooperative and by a periodic survey of principal retail outlets by the Fishing Authority. These activities yield an estimate of monthly fish catch with species breakdown for only a few species and no effort information except that obtained through vessel registration.

Tables 38 and 39 indicate catch and effort data requirements for both Council and Fishing Authority with respect to the small boat troll fishery. Entries reflect specific data items desired, their priority, and necessary periodicity of collection. Council requirement pertain only to billfish catch and effort in the troll fishery. Fishing Authority needs relate to catch and effort associated with the fishery as a whole. Table entries indicate other contrasts in Council and Fishing Authority data needs. However, the difference in periodicity requirements (monthly for the Council versus quarterly for the Fishing Authority) is the only one likely to generate conflicts in agency data collection requirements.

The only effort information now available is limited "effort descripbiton" data yielded by boat registration requirements of the Saipan Port District (Appendix 6.4). These data are not sufficient to fulfill either Council or Fishing Authority needs. Some of the Council's catch information requirements are satisfied by current Fishing Authority data collection activities, as indicated on Table 39. While not yielding numbers of billfish caught or area of catch, current data collection activities do provide an estimate of the weight of monthly billfish catches. These estimates, however, are suspect due to the data collection problems resulting from personnel limitations.

Approaches to upgrading the system are:

A LOGBOOK SYSTEM

Data collection utilizing logbook methods would have to be voluntary; licensing or enforced reporting requirements are not thought to be feasible. About 40 percent of all fishing vessels registered in the Islands belong to fishermen's cooperative members. Co-op members are the most active and productive fishermen. The manager of the Fishing Authority is also manager of the co-op. Thus, logbook distribution and collection could utilize co-op facilities and communication channels. Log submission could be limited to fishermen landing billfish, or extended to all co-op offshore fishermen.

To operate effectively, a cooperative-based logbook system, each of the three cooperative locations (Saipan, Rota and Tinian), would have to be visited weekly to distribute logbooks, explain the system, collect statistical and biological data and monitor the operation. It is estimated that .5 man-years would be required.

Table 38. Western Pacific Regional Fishery Management Council and Northern Marianas effort data needs and the degree to which current Northern Marianas collection fulfills Council needs.1/

Fishery	Effort Data														
	Effort description 2/	No. fishermen (anglers)	No. vessel-trips	No. angler-trips	Days/hours absent	Days/hours searching	Days/hours fishing	Statistical area	Area fished (dragged, pond)	Depth gear set	No. hooks/traps/lines/nets	Bait type	Bait quantity used	No. gear sets	No. successful sets
Small boat troll 2/															
WPRFMC needs	7			4			4	4			4				
N. Marianas needs	7			5			5	5			5				
Degree of satisfaction	5			N			N	N			N				

1/ Symbols
Needs: See footnote 1, Table 4.
Satisfaction: See footnote 1, Table 6.

2/ Included in N. Marianas category "small scale offshore" fishery.

Table 39. Western Pacific Regional Fishery Management Council and Northern Marianas catch data needs and the degree to which current Northern Marianas collection fulfills Council needs. 1/

Fishery	Catch Data									
	No. schools sighted	No. schools fished	No. fish caught/landed	Wt. fish caught/landed	Statistical area of catch	Date/time of catch	Depth of catch	Species composition	Size composition (by species)	Sex composition (by species)
Small boat troll										
WPRFMC needs			4		4	4		4		
N. Marianas needs			S		N	S		S		
Degree of satisfaction			S		N	S		S		

1/ See footnote 1, Table 38

SURVEY INTERVIEW SYSTEM

To sample all offshore fishermen, the five principal harbor/launch sites on the three major islands- Saipan (three), Rota (one) and Tinian (one) would have to be surveyed periodically. At the present level of offshore fishing activity, this approach would produce little data for the effort. Concentration of survey efforts on cooperative members would be more cost effective. Initially, all (or a sample of) powered fishing boats (names obtained from vessel registration records) could be interviewed to establish the proportion of total billfish catch and effort accounted for by cooperative members. Concommitantly, the bulk of additional "effort description" data required could be gathered. These data could then be utilized to adjust data gathered in co-op surveys to obtain estimates of total billfish catch and effort. The system would require about .8 man-years annually to cover the three cooperative locations.

A FISH TICKET SYSTEM

A fish ticket system is not a feasible option, as much of the catch by the troll fleet does not enter commercial channels.

RANKED DATA COLLECTION TECHNIQUES

As detailed, a fish ticket system to collect Council-needed Northern Marianas fishery data is not appropriate; feasible options are logbook and survey/interview systems.

Quantitatively, the cooperative-based log system is estimated to annually require .5 man-years of labor, the co-op survey option .8 man-years.

Qualitatively, both options are similar in that an estimated 40 percent of fleet effort is covered. Additionally, the survey system samples only a part of the co-op effort, whereas a log system theoretically covers all of this effort.

Based on the above, a voluntary cooperative-based log system is ranked first, a survey system second.

6.3.2.5. NATIONAL MARINE FISHERIES SERVICE

Collection of data describing domestic operations is the responsibility of the State, Commonwealth or Territorial fisheries agencies within whose jurisdiction those operations are prosecuted. Foreign fisheries, on the other hand, fall under the purview of the NMFS. In the context of this report, foreign fishing activities can be grouped in two categories; those taking place within the FCZ, and those prosecuted outside the FCZ. The council is only mandated to collect data on foreign operations in the former category, but stock analyses require catch/effort data on all removals from

exploited fish stocks. While this presents practical difficulties to the Council, especially for highly migratory species such as billfish, this section of necessity, deals primarily with information collection alternatives for foreign fishing operations under the purview of the Council.

Under NMFS responsibility, only the foreign tuna longline fisheries incidentally taking billfish, the foreign bottomfish fisheries and the foreign precious coral fishery are of concern to the Council. Of these fisheries, operational aspects are known in detail only for the tuna longline fishery based in American Samoa.

The longline vessles based at Pago Pago, American Samoa, fish primarily for albacore, bigeye and yellowfin tuna in areas beyond the FCZ. Billfish, wahoo and occasionally mahimahi are taken incidentally in the zone. The number of vessels usually fluctuates between 100 and 150, but has reached as high as 280 in the past. Extended trips are common and vessels may return to Pago Pago only once or twice yearly. Nearly all fishing is done well beyond 200 miles from American Samoa, but some effort does take place within American Samoa's 200-mile FCZ. Catches are delivered almost exclusively to the two canneries on American Samoa.

Foreign-based Japanese, and occasionally Taiwanese and South Korean, longliners prosecute a seasonal tuna fishery north of Hawaii that at times enters FCZ waters off the Islands. The number of vessels varies from season to season. Most never visit island ports. Some longlining occurs off Guam and the Northern Marianas, but little is known of this activity except that it is sporadic and relatively small scale. These boats also seldom visit island ports.

Similarly, little is known of the foreign bottomfish and precious coral fisheries that are sporadically prosecuted in FCZ waters off Hawaii, and occasionally Guam and the Northern Marianas. Only a few trawlers and line boats are involved.

NMFS data collection activities in these fisheries are limited to the longline fishery based in American Samoa. Detailed catch and effort data are provided by logbooks completed by vessel captains, and by reports obtained with cannery cooperation. A joint effort by NMFS and the Office of Marine Resources, American Samoa, produce these data which are mailed in raw form to NMFS in Honolulu for processing and evaluation.

NMFS does gather data on other longlining operations within the FCZ (and outside as well), but these are primarily culled from Japanese Government fisheries publications after considerable time lag. Little data are presently available describing foreign bottomfish and precious coral operations.

Tables 40 and 41 indicate catch/effort data requirements of both the Council and NMFS with respect to these fisheries; entries reflect specific data items desired, their priority and necessary periodicity of collection. Council requirements pertain only to catch and effort in the appropriate fisheries within the FCZ. Further, in the tuna longline fisheries, only catch/effort data associated with billfish are required. NMFS needs relate to catch and effort associated with the noted fisheries as a whole. Table entries indicate that data periodicity requirements of both the Council and NMFS are comparable, but that NMFS needs are slightly more extensive.

The degree to which current data collection activities by NMFS satisfy Council requirements is reflected in the table entries. The "4" entries under tuna longline data items reflect that currently collected information on the Samoa-based fishery, by far the most important longlining operation under the purview of the Council, satisfies nearly all Council data requirements. Information describing other longlining activities are inadequate, however, due to the long lag time before they become available. Data describing billfish catch and effort associated with the limited longlining operations off Guam and the Northern Marianas lack sufficient detail for Council needs.

Data describing foreign bottomfish and precious coral operations are presently sparse and inadequate for Council needs. Approaches to upgrading the data collection to meet Council needs are:

A LOGBOOK SYSTEM

Detailed catch (including that of billfish) and effort information produced by the present logbook system, complements data gathered through the canneries and essentially fulfills Council data needs in this fishery. The logs are collected by the full-time OMR technician, who also measures a sample of albacore from each unloading. Fish measurement sampling could be extended to billfish with the devotion of an additional .2 man-years of the technician's time yearly.

Foreign longline operations not based in American Samoa present a difficult problem. The same logbook format could be utilized and information required for billfish activities with the FCZ. It is unlikely that foreign governments will permit their vessels to supply directly to NMFS information on activities outside the FCZ and this will have to be obtained, in summary form, through government-to-government channels.

Foreign operators wishing to fish for bottomfish and precious coral within the FCZ require permits from the United States Government. The permits could require submission of catch and effort data in logbook format. No additional manpower would be required to integrate the data into the system.

Table 40. Western Pacific Regional Fishery Management Council and National Marine Fisheries Service - Honolulu effort data needs and the degree to which current NMFS-Honolulu collection fulfills Council need.1/

Fishery	Effort description	No. fishermen (anglers)	No. vessel-trips	No. angler-trips	Days/hours absent	Days/hours searching	Days/hours fishing	Statistical area	Area fished (dragged, pond)	Depth gear set	No. hooks/traps/lines/nets	Bait type	Bait quantity used	No. gear sets	No. successful sets
	Effort Data														
Billfish															
Foreign tuna longline															
Priority WPRFMC needs	7						4	4			4				
NMFS needs	7						4	4		4	4				
Degree of satisfaction	4						4	4			4				
Bottomfish															
Foreign line fishery															
Priority WPRFMC needs	7						4	4			4				
NMFS needs	7						4	4			4				
Degree of satisfaction	N						N	N			N				
Foreign trawl fishery															
Priority WPRFMC needs	7						4	4	4						
NMFS needs	7						4	4	4	4					
Degree of satisfaction	N						N	N	N	N					
Precious coral															
Foreign trawl fishery															
Priority WPRFMC needs	7						4	4	4						
NMFS needs	7						4	4	4						
Degree of satisfaction	N						N	N	N						

1/ Symbols:
Needs: See footnote 1, Table 4.
Satisfaction: See footnote 1, Table 6.

Table 41. Western Pacific Regional Fishery Management Council and NMFS-Honolulu catch data needs and the degree to which current NMFS-Honolulu collection fulfills Council needs. 1/

Fishery	Catch Data									
	No. schools sighted	No. schools fished	No. fish caught/landed	Wt. fish caught/landed	Statistical area of catch	Date/time of catch	Depth of catch	Species composition	Size composition (by species)	Sex composition (by species)
Billfish										
Foreign tuna longline										
WPRFMC needs			4		4	4		4	4	
NMFS needs			4	4	4	4		4	4	4
Degree of satisfaction			4		4	4		4	S	
Bottomfish										
Foreign line										
WPRFMC needs				4	4	4		4		
NMFS needs				4	4	4		4		
Degree of satisfaction				N	N	N		N		
Foreign trawl										
WPRFMC needs				4	4	4		4		
NMFS needs				4	4	4		4		
Degree of satisfaction				N	N	N		N		
Precious coral										
Foreign fishery										
WPRFMC needs				4	4	4		4		
NMFS needs				4	4	4		4		
Degree of satisfaction				N	N	N		N		

1/ See footnote 1, Table 40

SURVEY/INTERVIEW SYSTEM

This approach is not feasible for any of those foreign fisheries not based in American Samoa, as the vessels involved seldom visit American ports.

In American Samoa, survey techniques could yield the required information on the foreign longline fishery, but this alternative is not explored as the present well-developed system efficiently produces almost all information required by the Council.

A FISH TICKET SYSTEM

A modified fish ticket is currently utilized in American Samoa to gather catch and selected biological data on foreign longline operations based there. This is part of an excellent data collection system developed by NMFS after considerable study. Present fish ticket procedures should be retained.

A fish ticket system is not feasible for data collection purposes in the other foreign fisheries of concern to the Council, as the catches in these fisheries are not marketed in the United States.

RANKED DATA COLLECTION TECHNIQUES

The above discussion narrows feasible collection alternatives for NMFS-collected data to one - a logbook system, covering foreign longline, bottomfish and coral fisheries. It is estimated that such a collection system could be implemented with existing NMFS Honolulu Laboratory capabilities. However, an unknown amount of high level NMFS, Washington, D.C. personnel time, as well as possible Department of State personnel time may be required.

6.3.3. DATA REDUCTION - BY AGENCY

6.3.3.1. AMERICAN SAMOA OFFICE OF MARINE RESOURCES

The Samoan Office of Marine Resources is not currently using data processing support in either data collection or analysis. However, government computer facilities are available. The system is used for storing and retrieving and listing data in various forms for government payroll, labor distribution, and equipment list reports for use by government departments.

A first alternative for reducing Samoan troll billfish catch/effort data is for the Office of Marine Resources to have the work done at the government computer center. Data entry could be handled using key punch equipment; verification of OMR personnel using printed lists and the original forms. Validation depends upon the availability of scientific programming.

Local reduction would require approximately .1 man-years of labor to the OMR, as well as .1 machine-years of data entry/editing equipment (key punch, CRT, etc.). Verification and validation may require the addition of scientific programming, as well as analytic expertise. Timeliness of updating the central data base with local data reduction depends on the accessibility of data processing capability in American Samoa.

Alternately, reduction of the data could be accomplished at a central site. Assuming equipment availability, the central reduction option would require about .1 man-years of labor and .1 machine-years of data entry/editing equipment. Verification and validation quality, as well as timeliness of central file updating would be entirely under Council control.

Quantitatively, costs of both local and central reduction of Council-needed American Samoa catch/effort data are identical - both options are estimated to require .1 man-years of data technician labor and .1 machine-years of data entry/editing equipment (key punch or key-to-disk or-tape).

Qualitatively, the ability of the Samoan Office of Marine Resources Resources to reduce collected data is unclear. As noted, the Office is not currently using data processing equipment for either data storage or analysis. The Office is unlikely to inaugurate such use solely to satisfy Council data needs, particularly since the expected volume of needed data is low. Additionally, since data processing is not currently used, verification and especially validation procedures are probably not familiar to OMR personnel.

On the basis of the quantitative assessment modified by qualitative considerations, central Council reduction of Council-needed Samoa data is ranked first; local reduction second.

6.3.3.2. GUAM AQUATIC AND WILDLIFE RESOURCES DIVISION

The Guam troll fishery will generate only a modest amount of data needed for Council activities. The Government of Guam has an IBM 371/15-based computer system with tape and disk storage. Aquatic and Wildlife Service fishery data is scheduled to be processed by computer in 1979. The director of the computer facility has expressed a willingness to undertake data processing for the Council activites. Thus, locally reduced data can be provided to the Council with no additions to current data processing capacity. Further, there is expertise available to assure quality verification and validation. The degree of timeliness of central data file updating cannot be anticipated.

A second alternative is central site reduction of Guam data. This option would require the addition of .5 man-year's labor and .5 machine years of data entry/editing equipment. Verification and

validation quality and timeliness of central file updating is under Council control.

Quantitatively, local reduction of Council-needed Guam fishery data has zero cost. As noted, available Guam Government computer center capabilities are more than adequate. Additionally, the reduction of this data is already planned by the Aquatic and Wildlife Service and copies of reduced data could be easily provided to the Council data center. Central reduction is estimated to require .5 man-year's labor and .5 machine-year's time.

Qualitatively, both local and central reduction are capable of producing reduced data of an acceptable quality; both are consistent with current activities (this assumes facilities for central reduction). Timeliness of central file updating with local reduction is unknown, however, estimated to be good.

Based on the above, local reduction of Council-needed Guam fishery data is ranked first; central reduction second.

6.3.3.3. HAWAII DIVISION OF FISH AND GAME

Curent Hawaii Division of Fish and Game data reduction activities are difficult to assess due to problems in the quality of collected data. For some fisheries, individual vessel monthly report forms are received between one and four months late. The HF&G files are closed arbitrarily after a period of time and coverage is not known. In addition to the usual problem of incomplete forms, HF&G personnel suspect that many forms are not completed accurately. Many Hawaiian fishermen have an inadequate command of English and either misinterpret report form instructions or make undecipherable entries. Superimposed on the problems is the reluctance, as expressed by many knowledgeable persons, of Hawaiian fishermen to report details of their fishing activities.

Current Hawaii Fish and Game data reduction procedures pose additional problems. Basic collection forms are organized such that data must be transcribed to coding forms before entry. Tabulated data is entered by key punching cards. Verification is by listing and checking.

Access to the State computer, an IBM 370/05, used by all State agencies, is a further problem. Job entry is by card deck at the computer, although HF&G has requested remote job entry equipment. Scheduling difficulties result in long turn-around time, an impediment to efficient data reduction. At the time of the LMR interview, system user needs were being assessed in an attempt to improve service and this may reduce turn-around time. Specific capabilities include producing data files on card decks or tape.

Local reduction can produce entered and verified data files in an appropriate form. Personnel limitations, however, suggest that timeliness of central file updating may be less than needed. As a first approximation, the volume of data generated can be expected to require about one man-year of labor and one machine-year of entry/editing equipment annually.

Central reduction would require .75 man-year's labor, .75 machine-years of entry/editing equipment. Validation quality and timeliness of central file updating would be centrally controlled.

Quantitatively, costs of local reduction of Council-needed Hawaii fisheries data are one man-year labor and one machine-year time for local reduction; for central reduction, .75 man-years and .75 machine-years.

Qualitatively, several features of Hawaii Department of Fish and Game's data processing capabilities raise doubts as to the Department's ability to meet Council needs. As discussed above, use of the State computer is difficult, all HF&G job entry being done by card deck. Additionally, deficient job scheduling results in possibly serious time delays - partially reflected in the increased data reduction cost estimates. HF&G personnel hiring restrictions suggest that serious backlogs may occur and that local Hawaii reduction may not allow timely updating of central Council files.

The above evidence suggests that central Council reduction of Council-needed Hawaii fisheries data be ranked first; local reduction second.

6.3.3.4. NORTHERN MARIANAS FISHING AUTHORITY

The Director of the Economic Development Division, administratively over the Fishing Authority, has expressed willingness to provide the Council with reduced fishery data on magnetic tape. However, data processing capability available to the Fishing Authority depends upon the Trust Territory Government's automatic Data Processing Unit continuing to be located in Saipan. The Trust Territory Government, along with its ADP facilities, may be relocated, probably within two years.

The Trust Territory's IMB 370/135 based system has sufficient key punch, card reader and disk storage facilities available. The system can provide either card or tape-based data files. The system is not fully utilized and the manager is seeking new business.

Should the Trust Territory computer system be removed from Saipan, the Economic Development Division plans to replace the system with a facility of its own, to handle all data processing and reporting for Northern Marianas agencies.

Based on our interview information, quality local data reduction can be accomplished at an estimated annual cost of .25 man-year's labor and .25 machine-year's time. As with all local options, timeliness of central file updating is unknown.

A second alternative, central Council reduction of Northern Marianas data, can be expected to require capabilities similar to those required for central processing of Samoa data - the addition of .25 man-year of labor and .25 machine-year of data entry/editing equipment. Reduction quality and central file updating timeliness are Council controlled.

Both local and central reduction will require an additional .25 man-year's labor and .25 machine-year's of entry equipment. The principal extenuating circumstances is the unknown replacement for the Trust Territory computer system due to be removed from Saipan, possibly by January, 1981. Northern Marianas Government officials assured the interviewer that the replacement was being contemplated; since capabilities of the new system are not known, a reasonable assumption is that capabilities will be adequate.

Central reduction of Council-needed Northern Marianas data is ranked first; local reduction second.

6.3.3.5 NATIONAL MARINE FISHERIES SERVICE

The Southwest Fisheries Center data processing philcsophy separates routine local computing from central file maintenance, computing and reporting on common data needed by all Center division (Honolulu is a division). Central system capbability is currently provided by a three-year contract (due to expire October, 1980), between NMFS and Computer Science Corporation with its INFONET computer system located in Los Angeles. Center data management personnel are currently reviewing alternative facilities to satisfy long-term Center needs. A report is expected in October, 1979.

Honolulu Laboratory ADP capability is provided by the University of Hawaii. The ADP unit is staffed by a supervisor, programmer and a key punch operator. Equipment includes two key punches, a remote CRT terminal and a remote 300/1200 BAUD keyboard printer terminal.

The INFONET System is capable of providing all data management services to the Honolulu Laboratory. Access is via a multiplexer reached at a local telephone number. Data entry is by either card deck or magnetic disk or tape. Card decks can be entered directly at the Coast Guard's remote job entry terminal located at the Honolulu Federal Building.

Tape files (produced from card decks at the University of Hawaii computer) can be either entered at the Coast Guard terminal or mailed to the Southwest Center's La Jolla headquarters and entered there. Additionally, the Coast Guard terminal has remote disk file creation capability which could be used for original Laboratory data entry.

Central INFONET data files can be stored off-line on tape or on-line - appropriate for editing or frequent access - on disk. Verification and validation can be accomplished from Honolulu Laboratory terminals.

The University of Hawaii IBM 370/175 based computer system, the largest in Hawaii, provides local Honolulu Laboratory data processing capability. Data entry is either by remote entry of original data (interactive CRT or printing terminal) or, for large files, by cards punched at the Laboratory. Disk and tape storage is available. Verification and validation can be accomplished from Laboratory terminals. An important limitation of the system is the increasingly long turn-around time experienced by NMFS users as a result of their low priority status, behind students and University of Hawaii administrative staff.

A first option for NMFS-collected data reduction, local reduction, can be accomplished with current capabilities. Data entry, as well as verification and validation, are well within NMFS-Honolulu Laboratory capabilities. Timeliness of Council file updating can be expected to be excellent.

A second option, central reduction of Council-needed data, should be possible with the addition of approximately .5 man-year's labor and .5 machine-years of data entry/editing machinery.

There are no qualitative caveats to local reduction. Local reduction is ranked first; central reduction second.

Table 42 summarizes results of the foregoing assessment of local versus central reduction of Council-needed, locally collected catch/ effort data. Entries suggest that local reduction of Council-needed data is appropriate for Guam - Northern Marianas - and NMFS - collected data; central Council-reduction for American Samoa - and Hawaii-collected data.

Table 42. Estimated costs and rankings of local and central reduction alternatives for Council-needed, agency-collected data.
See text for discussion

Collecting Agency	Reduction Alternatives: Local Cost C1*	C2	Q	Rank	Central Cost C1	C2	Q	Rank
American Samoa	0.10	0.10	-	2	0.10	0.10	+	1
Guam	.00	.00	+	1	0.50	0.50	+	2
Hawaii	1.00	1.00	-	2	0.75	0.75	+	1
No. Marianas	0.25	0.25	-	2	0.25	0.25	+	1
NMFS	.00	.00	+	1	0.50	0.50	+	2

*/ Symbols: C1 = data processing labor cost in man-years.
C2 = data entry/editing equipment cost in machine-years.
Q = qualitative factor reflecting non-quantifiable measures of capability.

6.4 DATA COLLECTION FORMS

6.4.1. Guam Fisheries

6.4.1.1. Aerial Fisheries Survey

6.4.1.2. Inshore Fishermen Interview and Creel Census

6.4.1.3. Offshore Recreational Fishing Census

6.4.2. Hawaii Fisheries

Hawaii Division of Fish and Game Forms:

6.4.2.1. Aku Catch Report

6.4.2.2. Application for Vessel Registration

6.4.2.3. Aquarium Fish Catch Report

6.4.2.4. Commerical Fishing License

6.4.2.5. Fish Catch Report

6.4.2.6. Fish Dealer's Report on Purchases of Fish and Shellfish

6.4.2.7. Flagline Catch Report

6.4.2.8. Green Sea Turtle Catch Report

6.4.2.9. Pond Operator's Monthly Fish Report

National Marine Fisheries Service Forms for Hawaii:

6.4.2.10 Commercial Fish Catch Report

6.4.2.11. Crustacean Tagging and Morphometric Form

6.4.2.12. Daily Catch Report - Handline Fishing

6.4.2.13. Demersel Catch Form

6.4.2.14. Standardized Surface Trolling Data Sheet

6.4.2.15. Commercial Trap, Pot, and Net Report

6.4.3. Northern Marianas Fisheries

6.4.3.1. Application for Municipal Business

6.4.3.2. Application for Registration and Number for Vessel

6.4.3.3. Purchase Slip

6.4.3.4. Sales Slip

6.4.4. United States Coast Guard

6.4.4.1. Certificate of Admeasurement

AERIAL FISHERIES SURVEY

DATE _____ FLIGHT NO. _____ SKY STATE _____ WIND _____

SEA STATE _____ TAKE OFF TIME _____ LANDING TIME _____ OBSERVER _____

	Census Regions												Total # Animals	Total # Persons	Total # Boats
	1	2	3	4	5	6	7	8	9	10	11	12			
Turtles															
Sharks															
Pole Fishing															
Cast Netting															
Spearing															
Gill/Sur-round Netting															
Spinning															
Bottom Boats															
Trolling Boats															
Unidentified Persons															
Unidentified Boats															
Totals															

NOTE: Prior to 1977, there were 12 regions.

DIVISION OF FISH AND WILDLIFE
DEPARTMENT OF AGRICULTURE
GOVERNMENT OF GUAM

INSHORE FISHERMEN INTERVIEW AND CREEL CENSUS

Tide: _____ Sky State: _____ Date: _____ 19_____

Wind: _____ Sea State: _____ Time of Interview: _____

Area: _____ Reef Zone: _____

Type of Fishing: Hook and Line: _____, Throw-net: _____ Spear: _____

Surround net: _____, Gill net: _____ Spinning: _____ Other: _____

No. of Fishermen: _____ Interviewer: _____

Time Started Fishing: _____ Estimated Time Stop Fishing: _____

Bait used (if any):_____ Preferred Fish: _____

_____ _____

SPECIES	NO. CAUGHT	LN.	WT.	LN.	WT.	TOTAL WT.	REMARKS

DIVISION OF AQUATIC & WILDLIFE RESOURCES
DEPARTMENT OF AGRICULTURE
GOVERNMENT OF GUAM

OFFSHORE RECREATIONAL FISHING CENSUS

BOAT _____ LANDING _____ DATE _____

DEPARTURE:

INTERVIEW TIME _____ DEPARTURE TIME _____ TIDE _____ WIND _____

SKY STATE _____ PROPOSED FISHING AREA _____

NO. PASSENGERS _____ INTERVIEWER _____

RETURN:

INTERVIEW TIME _____ RETURN TIME _____ TIDE _____ WIND _____

SKY STATE _____ ACTUAL FISHING AREA _____

NO. FISHERMEN _____ NO. LINES: TROLLING _____ BOTTOM _____

TIME SPENT FISHING _____ TO _____ TIME MOST FISH CAUGHT _____

TYPE OF FISHING: TROLLING, SPEAR, BOTTOM, OTHER _____

TYPE OF EQUIPMENT: HANDLINE, SPINNING REEL, TROLLING REEL, HAWAIIAN SLING, ARBALE, OTHER _____

TYPE OF BAIT: LIVE _____ DEAD _____ INTERVIEWER _____

LURE _____ OTHER _____

SPECIES	NO. CAUGHT	Ln.	Wt.	TOT. WT.	AREA CAUGHT AND REMARKS

DEPARTMENT OF LAND AND NATURAL RESOURCES

AKU CATCH REPORT

Appendix 6.4.2.1.

DIVISION OF FISH AND GAME, STATE OF HAWAII

C-4 (Revised 7/64

Name of Licensee _____ Fisherman's License No. 113 Month _____ 19____

Name of Boat _____ F. G. No. _____ Type of Fishing _____

Day Fished	Area Fished	Zero Catch ▲	Port of Landing	AKU (Skipjack) 002			MAHIMAHI 013			OTHERS				OTHERS				
				No. Caught	Lbs. Caught	Value*	No. Caught	Lbs. Caught	Value*	Species Caught	No. Caught	Lbs. Caught	Value*	Species Caught	No. Caught	Lbs. Caught	Value*	No. of Men on Boat

BAIT REPORT

Day Fished	Locality Fished	■ Zero Bait Catch		Time Taken †		SPECIES TAKEN			Quantity Taken in Buckets	Quantity Used in Buckets	Quantity Died in Buckets	Quantity Left Over in Buckets
				Day	Night	Nehu #1	Iao #2	Other (Give Name) √				

The reports contained hereon are true, correct, and complete to the best of my knowledge and belief.

Signature _____
Licensee or Authorized Agent

▲ Check "Zero Catch" if no fish was caught.

* "Value" represents monies received.

■ Check "Zero Bait Catch" if no bait was taken.

† Check one to indicate whether baiting was done day or night.

√ Check either nehu or iao—write out name of bait fish if other than nehu or iao.

(HAR-B 5 76)

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION, HARBORS DIVISION
79 South Nimitz Highway, Honolulu, Hawaii 96813

HA

APPLICATION FOR VESSEL REGISTRATION AND CERTIFICATE OF NUMBER
For Undocumented Vessel Principally Used in Hawaii

(1) TYPE OF REGISTRATION *(Circle One)* 1. NEW 2. TRANSFER OF OWNERSHIP

(2) NUMBER NOW ON OR AWARDED TO THIS VESSEL *(If none so state)*

(3) NEW OWNER'S LAST NAME FIRST MIDDLE

(3a) TELEPHONE NO. HOME: BUS.:

(4) RESIDENCE AND MAILING ADDRESS STREET/POST OFFICE BOX

(4a) EMPLOYED BY

(5) CITY POST OFFICE STATE ZIP CODE NO.

(6) DATE OF BIRTH

(7) CO-OWNER'S LAST NAME FIRST MIDDLE

(7a) TELEPHONE NO.

(8) RESIDENCE AND MAILING ADDRESS STREET/POST OFFICE BOX

(8a) EMPLOYED BY

(9) CITY POST OFFICE STATE ZIP CODE NO.

(10) DATE OF BIRTH

(11) LIEN HOLDER–MORTGAGEE *(Attach separate sheet if necessary)*

(12) DATE OF LIEN

(13) STREET ADDRESS OR BOX NUMBER

(12a) DATE LIEN SATISFIED

(14) CITY POST OFFICE STATE ZIP CODE NUMBER

(15) CITIZENSHIP OF OWNER/S *(Circle One)*
U.S.A. ALIEN IF ALIEN GIVE COUNTRY

(16) RADIO COMMUNICATIONS *(Circle One)*
1. NONE 2. SENDING 3. RECEIVING 4. BOTH
5. RADIO CALL LTRS

(17) IF THE VESSEL HAS BEEN AWARDED AN OUT-OF-STATE NUMBER, ATTACH THE REGISTRATION DOCUMENTS ISSUED BY THAT STATE OR COUNTRY IF AVAILABLE AND COMPLETE THE FOLLOWING: 1. VESSEL ENTERED HAWAII (DATE) _____
2. VESSEL FIRST OPERATED IN HAWAII (DATE) _____

(18) PLACE KEPT *(Complete 1 or 2)* WHEN NOT IN USE VESSEL IS USUALLY: 1. MOORED AT *(Island and Harbor)* 2. STORED ON LAND AT *(Island)*

(19) TYPE OF VESSEL *(Circle One)* 1. CABIN MOTORBOAT 2. OPEN MOTORBOAT 3. RUNABOUT
(4) AUXILIARY POWERED SAILING VESSEL 5. SAILING VESSEL
(6) MOTOR VESSEL (MORE THAN 65' IN LENGTH) 7. OTHER *(Describe)*

(20) NUMBER OF HULLS

(21) COLORS 1. HULL: _____
2. CABIN TOP &/OR DECK: _____
3. TRIM : _____

(22) NAME OF VESSEL

(23) YEAR BUILT

(23a) YEAR MODEL

(24) VESSEL LENGTH FEET INCHES

(25) HULL MATERIAL *(Circle One)* 1. WOOD 2. STEEL
3. FIBERGLASS/PLASTIC 4. ALUMINUM 4a. RUBBER/FABRIC
5. OTHER

(26) ENGINE 1. MANUFACTURER _____
2. SERIAL NO. _____

(27) HULL MANUFACTURER'S NAME

(28) COUNTRY WHERE HULL BUILT

(29) HULL IDENTIFICATION NUMBER. IF NONE OR OBLITERATED, SO STATE.

(30) TYPE OF FUEL *(Circle One)*
1. GASOLINE 2. DIESEL 3. OTHER

(31) PROPULSION *(Circle One)* 1. OUTBOARD 2. INBOARD 3. INBOARD/OUTBOARD
4. SAIL ONLY 5. SAIL & INBOARD 6. SAIL & OUTBOARD 7. MANUAL 8. OTHER

(32) PRINCIPAL USE *(Circle One)* 1. PLEASURE 2. COMMERCIAL FISHING 3. CHARTER FISHING 4. COMMERCIAL PASSENGER 5. OTHER COMMERCIAL
6. LIVERY 7. DEALER 8. MANUFACTURER 9. FEE EXEMPT YOUTH GROUP 10. FEE EXEMPT–GOV'T. 11. OTHER (Describe)

(33) AUTHENTICATION. THIS SECTION MUST BE COMPLETED BY ALL APPLICANTS. I/We hereby certify under penalty of law that the information given by me/us on this application is true, correct and complete to the best of my/our knowledge and belief.

Signature(s) Date(s) Signed

Owner: _____ _____

Co-owner _____ _____

Co-owner _____ _____

Please send Check or Money Order payable: Harbors Division
PLEASE DO NOT MAIL CASH

FOR HARBORS DIVISION USE ONLY

Subscribed before me this _____ day of _____, 19____ (Signature) _____

DATE PROCESSING COMPLETED By:

EXPIRATION DATE

INFORMATION ESTABLISHING PROOF OF OWNERSHIP

The "Certificate of Sale" is to be completed by the seller unless he gives the buyer a "Bill of Sale".

The "Affidavit of Applicant" is to be completed by the purchaser if the seller did not complete the "Certificate of Sale" or the applicant has no other evidence of ownership. Do not complete the "Affidavit of Applicant" if a document showing that the vessel was registered by the applicant in another state is attached.

The Department, if not satisfied with the evidence submitted as proof of ownership, may require additional information or documents issued by that state if available. Application to register a vessel which has been registered in another state must be accompanied by the registration documents.

CERTIFICATE OF SALE
(To Be Completed By Seller)

I/WE (Seller's Name) _____

(Circle One) 1. DEALER 2. BUILDER/MANUFACTURER 3. OTHER

ADDRESS _____

TRANSFERRED *(Circle One)* 1. ALL 2. PART INTEREST IN THE VESSEL DESCRIBED ON THE REVERSE SIDE OF THIS FORM ON (Day, Month, Year transferred) _____

AT (City or County/State) _____

TO THE FOLLOWING PERSON(S) Name(s) _____

AND IS FREE OF ALL ENCUMBRANCES EXCEPT ANY SHOWN ON THE REVERSE OF THIS FORM.

I/WE HEREBY CERTIFY UNDER PENALTY OF LAW THAT THE FOREGOING IS TRUE AND CORRECT.

Signature(s) of Seller(s) — Date(s) Signed

_____ _____

_____ _____

_____ _____

AFFIDAVIT OF APPLICANT

I/WE DECLARE THAT *(Circle One)* 1. ALL 2. PART INTEREST IN THE VESSEL DESCRIBED ON THE REVERSE SIDE OF THIS FORM WAS ACQUIRED BY ME FROM (Name and Address of previous owner)

_____

IN THE FOLLOWING MANNER: *(Circle One)*

1. PURCHASE 2. TRADE/SWAP 3. GIFT 4. OTHER (Specify) _____

AT (City or County/State where acquired) _____

ON (Day, Month, Year acquired) _____

I/WE CERTIFY UNDER PENALTY OF LAW THAT THE FOREGOING IS TRUE AND CORRECT.

Signature(s) — Date(s) Signed

OWNER _____ _____

CO-OWNER _____ _____

CO-OWNER _____ _____

AFFIDAVIT OF VESSEL REGISTRAR

The applicant presented saisfactory evidence of ownership of the vessel described in this application in the form of _____

_____

which was examined by me and returned to the applicant.

Signature — Date

_____ _____

DECLARATION OF JOINT OWNERSHIP

WE, THE UNDERSIGNED, DO HEREBY DECLARE THAT THE OWNERSHIP OF VESSEL HA _____ IS HELD IN OUR JOINT NAMES AS JOINT TENANTS, WITH RIGHTS OF SURVIVORSHIP AND NOT AS TENANTS IN COMMON.

SIGNATURE _____ DATE _____

SIGNATURE _____ DATE _____

STATE OF HAWAII
DEPARTMENT OF LAND
AND NATURAL RESOURCES

Division of Fish and Game
1151 Punchbowl Street, R
Honolulu, Hawaii 96813

AQUARIUM FISH CATCH REPORT

e Instructions on Inside of Cover

ime_____
LAST FIRST M.I.

ne Fished_____ Month Fished_____, 19___

tal No. of Days Fished_____

tal No. of Hours Fished_____

ncludes actual dive time, norkel time, shoreline time, etc.

[Totals are for all persons included on this form.]

Aquarium Permit No. _____

Commercial Fisherman Yes _____ No _____

If yes, License No. 7 - [ ][ ][ ][ ]

Species	Computer Code Division Use Only	Ave. Depth (ft.)	Total Caught	Commercial Fishermen Only: Export No. Sold	Export Total Value	Local No. Sold	Local Tot Val
MILY CHAETODONTIDAE							
Holacanthus arcuatus	8554575201						
Centropyge potteri	8554575303						
C. flammeus	8554575304						
C. fisheri	8554575301						
Heniochus acuminatus	8554570502						
Hemitaurichthys zoster	8554570602						
Forcipiger longirostris	8554570401						
Forcipiger flavissimus	8554570101						
Chaetodon fremblii	8554570701						
C. reticulatus	8554570702						
C. corallicola (kleini)	8554570703						
C. ephippium	8554570705						
C. auriga	8554570706						
C. unimaculatus	8554570707						
C. lunula	8554570708						
C. trifasciatus	8554570710						
C. ornatissimus	8554570711						
C. quadrimaculatus	8554570712						
C. multicinctus	8554570713						
C. miliaris	8554570715						
C. tinkeri	8554570704						
C. lineolatus	8554570709						
MILY LABRIDAE							
Bodianus bilunulatus	8555070201						
Labroides phthirophagus	8555070401						
Gomphosus varius	8555071501						
Cirrhilabrus jordani	8555070601						
Pseudocheilinus octotaenia	8555070802						
P. evanidus	8555070801						
Cheilinus bimaculatus	8555070702						
Thalassoma duperreyi	8555071405						
T. ballieui	8555071407						
Iniistius pavoninus	8555071103						
Coris flavovittata	8555071601						
C. ballieui (rosea)	8555071605						
C. venusta	8555071603						
C. gaimardi	8555071604						
Pseudojuloides cerasinus	8555071701						
Stethojulis balteata (axillaris, albovittata)	8555071801						
Cheilio inermis	8555070101						
Macropharyngodon geoffroyi	8555072001						
Anampses rubrocaudatus	8555072101						
A. cuvieri	8555072102						
A. chrysocephalus	8555072101						
Halichoeres ornatissimus	8555072201						
MILY POMACENTRIDAE							
Dascyllus albisella	8554640101						
D. trimaculatus	8554640104						
Abudefduf abdominalis	8554640202						
A. sordidus	8554640201						
A. imparipennis	8554640203						
Chromis ovalis	8554640502						
C. leucurus	8554640503						
C. verator	8554640504						
Pomacentrus jenkinsi	8554640401						
MILY HOLOCENTRIDAE							
Holocentrus diadema	8546180105						
H. xantherythrus	8546180107						
Myripristis argyromus	8546180404						
MILY ACANTHURIDAE							
Acanthurus achilles	8555690103						
A. olivaceus	8555690109						
A. glaucopareius	8555690104						
A. mata	8555690112						
A. sandvicensis	8555690101						
A. dussumieri	8555690110						
A. nigrofuscus	8555690107						
Naso unicornis	8555690404						
N. brevirostris	8555690401						
Ctenochaetus strigosus	8555690201						

Species	Computer Code / Division Use Only	Ave. Depth (ft.)	Total Caught	Commercial Fishermen Only			
				Export		Local	
				No. Sold	Total Value	No. Sold	Total Value
Zebrasoma flavescens	8555690301						
Z. veliferum	8555690302						
ILY BALISTIDAE							
Balistes bursa	8558020501						
Melichthys vidua	8558020402						
M. buniva	8558020401						
Rhinecanthus rectangulus	8558020201						
R. aculeatus	8558020302						
Xanthichthys ringens	8558020201						
ILY MONACANTHIDAE							
Pervagor spilosoma	8558025201						
Amanses carolae	8558025502						
Alutera scripta	8558025102						
ILY CIRRHITIDAE							
Paracirrhites arcatus	8554660101						
P. fosteri	8554660102						
P. cinctus	8554660401						
Cirrhitus alternatus	8554660201						
Oxycirrhites typus	8554660301						
ILY MURAENIDAE							
Echidna zebra	8522050201						
E. nebulosa	8522050202						
Gymnothorax flavimarginatus	8522050605						
G. meleagris	8522050506						
G. eurostus	8522050607						
Muraena pardalis	8522050401						
Uropterygius knighti	8522050304						
CELLANEOUS							
Abantennarius analis	8541070101						
Antennarius drombus	8541070303						
Arothron hispidis	8558060302						
A. meleagris	8558060301						
Aulostomus chinensis	8549060101						
Apogon brachygrammus	8554180426						
Caesioperca thompsoni	8554020603						
Canthigaster cinctus	8558065101						
C. jactator	8558065102						
Cheilodactylus vittatus	8554690101						
Dactyloptena orientalis	8552010107						
Dendrochirus brachypterus	8552010301						
Diodon hystrix	8558080201						
Exallias brevis	8555340101						
Kuhlia sandvicensis	8554140101						
Lactoria fornasini	8558030301						
Microcanthus strigatus	8554530301						
Ostracion lentiginosus	8558030201						
Pterois sphex	8552010201						
Parupeneus porphyreus	8554470303						
P. multifasciatus	8554470305						
P. pleurostigma	8554470301						
Scorpaenopsis gibbosa	8552010701						
S. cacopsis	8552010702						
Scorpaena coniorta	8552011101						
Taenianotus triacanthus	8552010101						
Zanclus canescens							
ERTEBRATES							
Isaurus elongatus	3756010101						
Conus textile	7023320106						
Cypraea caputserpentis	7022840113						
Acanthaster planci	7832030101						
Heterocentrotus mammillatus	7852240301						
Stenopus hispidis	6485110101						
Hymenocera elegans	6483330201						
Hippolysmata acicula	6483430102						
Saron marmoratus	6483430301						
Enoplometopus occidentalis	6485010101						
Dardanus gemmatus	6487130411						
Aniculus maximus	6487130101						
IERS (write in)							

Appendix 6.4.2.4.

FG-1 (Rev. 7/77)

1 ☐ NEW
2 ☐ RENEWAL

State of Hawaii
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FISH AND GAME

COMMERCIAL FISHING LICENSE
1977 – 1978

LICENSE NO. 78 –

Eff. (date of issue to June 30, 197_)

LICENSE FEE
1 ☐ RESIDENT* $10.00
2 ☐ NON-RESIDENT $20.00

Name (Last, First, Middle Initial)	Sex M ☐ F ☐	Birth Date	Weight	Height	Color of Hair	Color of Eyes

Mailing Address		City	County/State	Zip
Residence	Street No. & Name	City	County/State	Zip

Birth Place	Length of Residence in Hawaii	U.S. Citizen? 1 ☐ Yes 2 ☐ No	Business Phone	Home Phone

CHECK ONE:

1 ☐ CREW MEMBER
Name of Boat ______
Name of Boat ______

2 ☐ BOAT CAPTAIN
HA No. ______
Documented No. ______
Number of Crew ______
Port of Anchorage ______

3 ☐ SHORELINE FISHERMAN

PRIMARY TYPE OF FISHING
(Check no more than 2)

A ☐ Aquarium
B ☐ Fish Pond
C ☐ Hand (limu, opihi, etc.)
D ☐ Handline (deep sea, inshore)
E ☐ Longline (ahi, aku, etc.)
☐ Nets ______ SPECIFY (gill, throw, trawl, purse, surround, etc.)
F ☐ Pole & Line (aku boats, shoreline)
H ☐ Traps (pots)
I ☐ Trolling
☐ Other ______ SPECIFY

X ______
SIGNATURE OF LICENSEE

If Minor
below age 18 ______
PARENT OR GUARDIAN

VALIDATION (FISH AND GAME USE ONLY)

AGENT ______

DATE ______ ISLAND ______

Monthly Fish Catch Report Required? 1 ☐ Yes 2 ☐ No

*ANY PERSON WHO HAS RESIDED IN THE STATE FOR ONE YEAR OR LONGER (HAWAII REVISED STATUTES 189-2)

NATURAL RESOURCES

FISH CATCH REPORT

STATE OF HAWAII

Name of Licensee .... 2. Commercial Fishing License No. .... 7[ ]-[ ][ ][ ][ ]

Name of Boat .... 4. HA No. [H][A]-[ ][ ][ ][ ]-[ ][ ] 5. Federal No. [ ][ ][ ][ ][ ][ ]

Month Fished .... 7. Year Fished–19[ ][ ]

Day	9. Area Fished	10. Type of Fishing Gear Used	11. Species Caught	12. No. Caught	13. Lbs. Caught	14. Lbs. Sold	15. Value of Lbs. Sold	16. Port of Landing

Instructions on Inside of Cover

The above report is true, correct, and complete to the best of my knowledge and belief.

(Rev. 4 76)

17. Signature ....
Licensee or Authorized Agent

SEND THIS IN

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

DIVISION OF FISH AND GAME

FISH DEALER'S REPORT ON PURCHASES OF FISH AND SHELLFISH

Fish Dealer ______________________ Phone No. ______________

Business Address ______________________

19___		FROM WHOM BOUGHT	SPECIES	LBS BOUGHT	AMOUNT PAID
MONTH	DAY				
			TOTAL		

The above report is true, correct, and complete to the best of my knowledge and belief.

Date ______________________ Signature ______________________
FISH DEALER OR AUTHORIZED AGENT

NOTE: The law requires this report to be filed on or before the tenth day of each month

Mail to: DIVISION OF FISH AND GAME
office on your island

FLAGLINE CATCH REPORT

Appendix 6.4.2.7.

Name of Permittee ..... Fisherman's License No. ..... Month ..... 19.....

Name of Boat ..... F.G. No. ..... No. of Baskets Used .....

Day of Landing	No. of Days at Sea	Area of Catch	Port of Landing	AHI (Yellowfin) 003			BIG EYE (Bluefin) 006			AHIPALAHA (Albacore Tombo) 004			STRIPED MARLIN 009			BLACK MARLIN 010			SHORT-NOSE MARLIN 107		
				No. Caught	Lbs. Caught	Value	No. Caught	Lbs. Caught	Value	No. Caught	Lbs. Caught	Value	No. Caught	Lbs. Caught	Value	No. Caught	Lbs. Caught	Value	No. Caught	Lbs. Caught	Value

Day of Landing	No. of Days at Sea	Area of Catch	Port of Landing	SILVER MARLIN 108			BROADBILL SWORDFISH 011			AU LEPE (Sailfish) 012			MAHIMAHI 013			ORO 014			OTHER (Give Name)*		
				No. Caught	Lbs. Caught	Value	No. Caught	Lbs. Caught	Value	No. Caught	Lbs. Caught	Value	No. Caught	Lbs. Caught	Value	No. Caught	Lbs. Caught	Value	Species Caught	Lbs. Caught	Value

HM-K-70

BAIT REPORT

LOCAL BAIT						IMPORTED BAIT											
OPELU**			OTHERS			MACKEREL (Saba) 96		SMELT 97		SARDINE 84		HERRING 85		OTHER 92			
Date Caught	Pounds Caught	Locality Caught	Species Bought	Date	Lbs. Bought	Date	Lbs. Bought	Date	Lbs. Bought	Date	Lbs. Bought	Date	Lbs. Bought	Date	Lbs. Bought		

The reports contained hereon are true, correct, and complete to the best of my knowledge and belief.

Signature .....
Permittee or Authorized Agent

* If several species are taken on a trip which are listed

Appendix 6.4.2.8.

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

Division of Fish and Game
1151 Punchbowl Street
Honolulu, Hawaii 96813

GREEN SEA TURTLE CATCH REPORT

Name_____ Permit No._____

Address_____

Island_____ Month_____ 19__

(Please use one line for each turtle caught)

Date	Location	Fishing Method	Shell Length In Inches	Total Weight In Pounds	Sex		Remarks
					Male	Female	

REMINDER: This report must be submitted no later than 10 days following the end of the month. If no turtles are caught during the month, write "NO CATCH" across the report form.

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

DIVISION OF FISH AND GAME

POND OPERATOR'S MONTHLY FISH REPORT

Name of Permittee_____ Month of_____ _____19____

Boat Permit No._____ TYPE ☐ (Powerboat) FG No._____

Name of Pond_____ (Rowboat) FGa No._____

Location of Pond_____ ☐ Pond Area Under Water_____Acres

SPECIES		NO. CAUGHT	POUNDS CAUGHT	POUNDS SOLD	VALUE*
Aholehole	027				
Amaama (Mullet)	030				
Awa	031				
Awaawa	033				
Carp	601				
Catfish	602				
Crab—Kuahonu (White)	702				
Crab—Moala (Red)	703				
Crab—Samoan	704				
Kaku	046				
Kawelea	049				
Lai	056				
Moi	069				
Oio	078				
Omilu	018				
Oopu	603				
Oopuhue	080				
Opae (Shrimp)	705				
Panchon	604				
Ulua (Papio)	023				

Estimated number of Pua introduced into the pond during the month_____

GRAPHIC DESIGNS

*Value represents the amount of money received for total pounds of fish sold. Do not record price per pound.

The above report is true, correct, and complete to the best of my knowledge and belief.

Signature_____ District_____
PERMITTEE OR AUTHORIZED AGENT

Island_____

NOTE: THIS REPORT SHOULD BE FILED ON OR BEFORE THE TENTH OF THE MONTH FOLLOWING.

Mail to: DEPARTMENT OF LAND AND NATURAL RESOURCES
400 South Beretania Street
Honolulu, Hawaii 96813

Control No. 58

NATIONAL MARINE FISHERIES SERVICE
SOUTHWEST FISHERIES CENTER HONOLULU LABORATORY

COMMERCIAL FISH CATCH REPORT

VESSEL _____ LOCATION _____ DATE _____

TIME STARTED _____ TIME ENDED _____ DEPTH ____fm. BAIT _____

Circle one

1. HANDLINE FISHING: NO. of LINES _____ NO. of HOOKS/LINE _____
2. TRAP / POT / NET FISHING: NO. of STRINGS _____ NO. of TRAPS/ POTS/ NETS/ STRING _____ DIST. BETWEEN TRAPS _____
3. TROLLING: NO. of LINES _____ TYPE of LURES _____

Species caught	Total number		Total weight		Remarks			
	Estimated	Actual	Estimated	Actual		L	S	B

LOCATION: Latitude and longitude desired. An alternative is a general location consisting of radar distance and compass bearing, i.e., 5 miles 45° NE of island. Use a new log sheet if the position is changed during the day.

TIME STARTED: Enter the time gear enters the water.

TIME ENDED: Enter the time gear is hauled out of the water.

DEPTH: Enter depth in fathoms. If depth varies, enter average depth.

BAIT: Enter kind of bait used.

ACTIVITY: Circle either (1) for Handline fishing, (2) for Trap, Pot and Net fishing, or (3) for Trolling.

Handline Fishing:

- No. of lines - Enter number of lines fishing.
- No. of hooks/line - Enter number of hooks per line.

Trap, Pot, or Net Fishing:

- No. of strings - Enter number of strings. (A string is an array of traps, pots, or nets or individually set gear).
- No. traps, pots, or nets/string - Enter number of traps, pots, or nets attached to each string. If the number of gear per string varies, enter average number. If both string(s) and individually set gear are used, enter total number of gear.
- Distance between gear - Enter distance between trap, pots, or nets. If distance varies, enter the average.

Trolling:

- No. of lines - Enter number of lines out.
- Type(s) of lure(s) - Describe type(s) of lure(s) used.

SPECIES CAUGHT: List all species caught. Incidental catches are also desired information.

TOTAL NUMBER: Use <u>either</u> the estimated or actual column.
- Estimated - enter estimated number of pieces.
- Actual - enter exact number of pieces caught.

TOTAL WEIGHT: Use <u>either</u> the estimated or actual column.
- Estimated - Enter estimated total weight.
- Actual - Enter exact actual weight. Usually, this cannot be done at sea.

REMARKS: Three dashed columns have been added for lobsters. - Enter the number of legal size lobsters under the column "L". Enter number of short lobsters under "S" column. Enter number of berried lobsters under the "B" column.

NATIONAL MARINE FISHERIES SERVICE
SOUTHWEST FISHERIES CENTER HONOLULU LABORATORY

CRUSTACEAN TAGGING AND MORPHOMETRIC FORM

Vessel ______ Cruise ______ Date ______

Capture: Station ______ Position ______ Release: Station ______ Position ______

Species	Tag No.	Carapace length (mm)	Carapace width (mm)	Tail length (mm)	Total length (mm)	Weight (kg)	Sex	Berried ova color	Sperm plate	Missing appendages
										L – A a 1 2 3 4 5 R – A a 1 2 3 4 5
										L – A a 1 2 3 4 5 R – A a 1 2 3 4 5
										L – A a 1 2 3 4 5 R – A a 1 2 3 4 5
										L – A a 1 2 3 4 5 R – A a 1 2 3 4 5
										L – A a 1 2 3 4 5 R – A a 1 2 3 4 5
										L – A a 1 2 3 4 5 R – A a 1 2 3 4 5
										L – A a 1 2 3 4 5 R – A a 1 2 3 4 5
										L – A a 1 2 3 4 5 R – A a 1 2 3 4 5
										L – A a 1 2 3 4 5 R – A a 1 2 3 4 5
										L – A a 1 2 3 4 5 R – A a 1 2 3 4 5
										L – A a 1 2 3 4 5 R – A a 1 2 3 4 5
										L – A a 1 2 3 4 5 R – A a 1 2 3 4 5
										L – A a 1 2 3 4 5 R – A a 1 2 3 4 5
										L – A a 1 2 3 4 5 R – A a 1 2 3 4 5
										L – A a 1 2 3 4 5 R – A a 1 2 3 4 5
										L – A a 1 2 3 4 5 R – A a 1 2 3 4 5
										L – A a 1 2 3 4 5 R – A a 1 2 3 4 5
										L – A a 1 2 3 4 5 R – A a 1 2 3 4 5
										L – A a 1 2 3 4 5 R – A a 1 2 3 4 5
										L – A a 1 2 3 4 5 R – A a 1 2 3 4 5

SPECIES

1. Panulirus penicillatus (spiny lobster, four spines between antenna base).
2. Panulirus marginatus (spiny lobster with two spines between antenna base).
3. Scyllarides squammosus (slipper lobster).
4. Ranina ranina (Kona crab).
5. Portunas sanguinolentus (white crab).

CARAPACE LENGTH

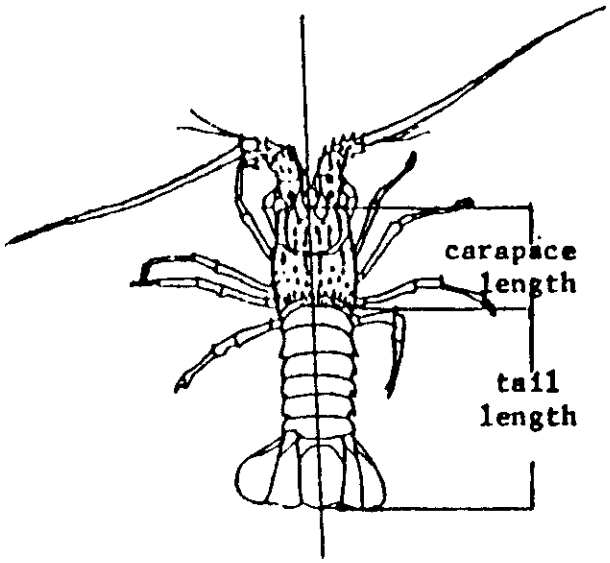
Along the midline from between the eyes to the end of carapace.

CARAPACE WIDTH

Maximum width of carapace (not including spines).

TAIL LENGTH

Measured along midline to include length of abdomen and tail.



SEX

Male: Sperm pore present at the base of the fifth leg.
Female: Pore present at the base of the third leg. Frequently a sperm plate extends between the third and fifth legs.

OVA COLORS FOR BERRIED CONDITION

1. Orange
2. Brown
3. White

CONDITION OF SPERM PLATE

1. Whitish brown
2. Brown smooth
3. Brown rough

MISSING OR BROKEN APPENDAGES

Circle the appropriate missing appendages using the following codes:

Code	Appendages	Code	Appendages
R	Right	1	First leg
L	Left	2	Second leg
A	Antenna	3	Third leg
a	Antennules	4	Fourth leg
		5	Fifth leg

Control No. 55 Appendix 6.4.2.12.

NATIONAL MARINE FISHERIES SERVICE
SOUTHWEST FISHERIES CENTER HONOLULU LABORATORY

C O N F I D E N T I A L

DAILY CATCH REPORT - HANDLINE FISHING

Vessel _____ Cruise _____ Date _____

Area fished _____ Station _____

Time fishing started _____ a.m. p.m. Time fishing ended _____ a.m. p.m.

No. of lines fishing _____ No. of hooks/line _____

Depth _____ Hook size _____

Drifting _____ or Anchored _____ Kind of bait _____

Catch results:

Species caught	Number	Weight (kg)

RFS 4/77

CONTROL NO. 18 / 1-2

NATIONAL MARINE FISHERIES SERVICE
SOUTHWEST FISHERIES CENTER, HONOLULU LABORATORY
HONOLULU, HAWAII 96812

DEMERSEL CATCH FORM

3-5 VESSEL	6-9 CRUISE	10-15 DATE

TRAWL TIME

16-17 OVERBOARD	ON BOTTOM	18-19 START RETRIEVAL	ELAPSED	ON SURFACE

20 OCT	21-24 LAT. (START)	25-28 LONG (START)	LAT. (END)	LONG (END)

29-31 STATION NO.

32-33 HAUL NO.

34-35 DIST FISHED

LORAN (START)		LORAN (END)	

TEMP °C

36-38 SURFACE	39-41 BOTTOM

BOTTOM SALINITY

XBT. NO.

BOTTOM DEPTH

START	END	42-45 MIN.	46-49 MAX.

BOTTOM TYPE

50-51 DESCRIPTION

WEATHER & SEA

52 CLOUD COVER	WIND DIR.	WIND FORCE	SEA

GEAR OPER

53-55 SCOPE	56-58 RPM	59-60 GEAR TYPE	61-62 DOOR & ACCESS.	63 PERFORMANCE

SOUNDER

64 MODEL / FREQ.	RANGE	VOL.	PULSE	TRACE DESCRIPTION

REMARKS _____

	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79			
SPECIES	CODE NO.					WEIGHT (NEAREST 1/10 LB.)						NUMBERS				WEIGHT RANGE	LENGTH RANGE	REMARKS

SOUTHWEST FISHERIES CENTER, HONOLULU LABORATORY

STANDARDIZED SURFACE TROLLING DATA SHEET

VESSEL _____ CRUISE NO. _____ DATE _____ TIME ZONE _____

EN ROUTE FROM: LAT. _____ LONG. _____ TO: LAT. _____ LONG. _____

OR OFF: _____ LAT. _____ LONG. _____ TOTAL HOURS TROLLED _____

OPERATION

ZONE TIME		TYPE OF TROLLING		SPEED	TIME	RECORDER	REMARKS	DIAGRAM OF LURE ARRANGEMENT
SET	HAULED IN	DIRECT	OTHER					

CATCH

LURE	ZONE TIME	SPECIES	FORK LENGTH (CM)	WEIGHT (KG)	SEX AND CONDITION	BIRD OR FISH SIGNS	MATERIAL PRESERVED	RECORDER	REMARKS (INCLUDE TAG NO.)

Appendix 6.4.2.15.

ONTROL No. 57

NATIONAL MARINE FISHERIES SERVICE
SOUTHWEST FISHERIES CENTER HONOLULU LABORATORY
Commercial

TRAP, POT, AND NET REPORT

VESSEL ______________ CRUISE __________ STATION __________ DEPTH __________

KIND OF BAIT ______________ POSITION ______________ STRING No. __________

SET GEAR: DATE __________ TIME __________ HAUL GEAR: DATE __________ TIME __________

Gear	Gear No.	Species	Total No.	Total weight (kg)	Legal			Short			Total berried	Size range (kg)
					Male	Female	Not sexed	Male	Female	Not sexed		
												-
												-
												-
												-
												-
												-
												-
												-
												-
												-
												-
												-
												-
												-
												-
												-
												-
												-
												-
												-
												-
												-
												-
												-
												-
												-

STRING No. - An assembly of traps, pots, or nets attached to a mainline. If there is more than one string per station, use a separate form for each string. Each string, when set in close proximity, should be numbered consecutively as they are retrieved.

GEAR No. - Assign numbers consecutively to gear attached to a string.

DEPTH - Record the average depth of the string.

LOCATION - Obtain a position fix by either longitude or latitude, Loran readings, two- or three-point compass fix, or a compass reading and an estimate of distance (by radar) from an island.

GEAR - Fish traps, shrimp traps, lobster pots, crab nets, etc.

SPECIES - Try to use the following codes for species caught. For other species, please specify.

Code	Local name	Common name	Scientific name
		FISH	
61-01	A'awa	Spotted wrasse	Bodianus bilunulatus
27-90	Alaihi	Squirrelfish	Holocentrus sp.
100-00	Aweoweo	Red bigeye	Priacanthidae
57-01	Hapuupuu	Sea bass	Epinephelus quernus
61-27	Hinalea luahine	Wrasse	Thalassoma ballieui
71-00	Fugu	Puffer	Tetradontidae
59-01	Kumu	Red goatfish	Parupeneus porphyreus
59-03	Malu	Goatfish	Parupeneus pluerostigma
65-01	Manini	Surgeonfish	Acanthurus sandvicensis
59-02	Moano	Goatfish	Parupeneus multifasciatus
69-01	O'ili uwiwi	Filefish	Pervagor spilosoma
58-01	Opakapaka	Pink snapper	Pristipomoides microlepis
55-11	Pig ulua (buta)	Thicklip ulua	Caranx cheilio
16-00	Puhi	Moray eel	Muraenidae
15-00	Puhi-uha	White eel	Congridae
58-03	Taape	Blueline snapper	Lutjanus kasmira
58-05	Ulaula (ehu)	Red snapper	Etelis marshi
55-16	Ulua	White ulua	Carangoides ajax
23-01	Upapalu	Cardinalfish	Apogon snyderi
27-01	Uu (menpachi)	Squirrelfish	Myripristis berndti
59-04	Weke-ula	Red goatfish	Mulloidichthys auriflamma
		CRUSTACEAN AND MOLLUSK	
410-01	'Ala-kuma	Spotted pebble crab	Carpilius maculatus
500-01	Hee (tako)	Octopus (day)	Polypus marmoratus
500-02	Hee (tako)	Octopus (night)	Polypus ornatus
402-01	Kona crab	Kona crab	Ranina ranina (serrata)
403-01	Kuahonu	White crab	Portunus sanguinolentus
405-01	Opae	Shrimp	Heterocarpus ensifer
405-02	Opae	Shrimp	Heterocarpus laevigatus
404-01	Opaelolo	Shrimp	Penaeus marginatus
408-00	Poki-poki	Box crab	Calappa sp.
401-01	Ula	Spiny lobster	Panulirus marginatus
401-02	Ula	Green lobster	Panulirus penicillatus
400-01	Ulapapapa	Slipper lobster	Scyllarides squammosus
406-00	Una-una	Hermit crab	Paguridae

NORTHERN MARIANA ISLANDS
OFFICE OF THE MAYOR
P. O. BOX 325
SAIPAN, MARIANA ISLANDS
9 6 9 5 0

APPLICATION FOR MUNICIPAL
BUSINESS

: SAIPAN MUNICIPAL BUSINESS LICENSE OFFICER

A: ECONOMIC DEVELOPMENT OFFICER, SAIPAN MUNICIPAL GOVERNMENT
TREASURER, SAIPAN MUNICIPAL GOVERNMENT

THE UNDERSIGNED HEREBY makes application for the following Municipal License
› engage in or continue, in the "Operation of Business", in the Municipality of
ıipan as defined in Municipal Ordinance No. 21-10-68, Section 1 thru Section 10.
ıy it be individual, co-partnership, cooperative, club or others: _____
_____
S P E C I F Y

ype of Business: _____

s required by this Ordinance for the issuance of such License, the applicant makes
ıe following statements:

. Applicant's full name: _____

. Name of Business: _____

. Applicant is a (an) _____
(Individual; co-partnership; cooperative, club)

_____
(Other not specify above).

. Location of Business: _____

. District No. _____ Lot No. _____

. Applicant is residing at _____ is _____ of age; is the owner of "Proposed Business to be Licensed"; and is a person of good morals and business standing.

7. No person other than the applicant named herein will have any interest in the business or license affected by this application without prior recommendation of the Municipal Government and approval of such interest by the Mayor or his duly representative.

8. Applicant is familiar with the provisions of the Ordinance relating to 21-10-68.

9. That prior to issuance of license applicant will submit such Public Health Clearance Certificate(s) and other requirements as may be required by law as a condition of issuing the license.

I, the APPLICANT, hereby certify that the statements contained herein are true and correct. I further agree that any license issued to me in response to this application will be granted and accepted by me upon condition that I fully comply with laws, rules and regulations now or hereafter applicable to my business and that I pay all assessed taxes and fees when due to the Municipal Treasurer.

Date: _____ 19 _____ _____
Signature of Applicant

APPLICATION FOR REGISTRATION AND NUMBER FOR VESSEL
BOARD OF MARINE INSPECTORS
TRUST TERRITORY OF THE PACIFIC ISLANDS

Name of Vessel _____ NO: _____
(for use of Dist. Admin)

Name of Owner _____ Address _____
(last, First, Middle)

Usual location of vessel _____

Type of Vessel _____ Number now on vessel _____

Service _____ Year completed _____

Tonnage _____ W/T or M/T cargo _____ Cruising Radius _____

Length _____ Rig _____ Beam _____ ft. Draft _____ ft.

Capacity _____ Passenger _____ Construction (wood, steel, etc) _____

Builder _____ Place built _____

Engine: Maker _____ Serial No. _____ H.P. _____

I certify that the statements herein made are true and that the boat described is owned by: _____

of _____

_____
Signature (Owner or authorized agent

FISH AUTH

TRUST TERRITORY OF THE PACIFIC ISLANDS

MARIANAS DISTRICT

PURCHASE SLIP NO. 0497

DATE

COMPANY

BOAT OR FISHERMAN

CO-OP NO.

REMARKS

SP.	PRODUCT PURCHASED LOCAL NAME	ENGLISH NAME	UNIT PRICE	UNIT	AMOUNT
105	ATULAJ	MACKEREL			
308	BUHA	SNAPPER			
489	GADAO PENTU	GROUPER			
253	GADDAS	GIANT WRASSE			
601	HAGGAN	TURTLE			
007	HUGUPAO	SURGEON			
541	ALU	BARRACUDA			
524	HITING	RABBITFISH			
522	HITING FEDA	RABBITFISH			
461	KACHUG	YELLOWFIN TUNA			
457	KACHO	SKIPJACK TUNA			
433	LAGGUA	PARROTFISH			
363	LAIGUAN	MULLET			
284	MAFUTE	SNAPPER			
926	MAHONGAN	LOBSTER			
218	SAGAMELON	SQUIRRELFISH			
452	SAOWARA	WAHOO			
525	SESJUN	RABBITFISH			
099	TARAKITO	CREVALLY			
021	TATAGA	UNICORN			

WEATHER: (CHECK ONE)
1. ☐ GOOD 2. ☐ FAIR 3. ☐ POOR 4. ☐ RAINY

TOTAL 57 15

FISH SPEC

TRUST TERRITORY OF THE PACIFIC ISLANDS

MARIANAS DISTRICT

SALES SLIP NO. 0487

ISLAND _____ DATE 1 1 1 4 7 [illegible]

BUYER Dairy Farm

SELLER [illegible]

SP	PRODUCT SOLD LOCAL NAME	ENGLISH NAME	UNIT PRICE	UNIT	AMOUNT
105	ATULAI	MACKEREL			
308	BUHA	SNAPPER			
489	GADAO PENTU	GROUPER			
253	GADDAS	GIANT WRASSE			
601	HAGGAN	TURTLE			
007	HUGUPAO	SURGEON			
541	ALU	BARRACUDA			
524	HITING	RABBITFISH			
522	HITING TEDA	RABBITFISH			
461	KACHUG	YELLOWFIN TUNA			
457	KACHO	SKIPJACK TUNA			
433	LAGGUA	PARROTFISH			
363	LAIGUAN	MULLET			
284	MAFUTE	SNAPPER			
926	MAHONGAN	LOBSTER			
218	SAGAMLEON	SQUIRRELFISH			
452	SAOWARA	WAHOO			
525	SESJUN	RABBITFISH			
099	TARAKITO	CREVALLY			
021	TATAGA	UNICORN			

TYPE OF SALE: (CHECK ONE)

1. ☒ LOCAL RETAIL 2. ☐ LOCAL WHOLESALE ☐ EXPORT

TOTAL ▶

Appendix 6.4.4.1

DEPARTMENT OF TRANSPORTATION
U. S. COAST GUARD
CG-1414 (Rev. 9-67)

Form approved
Budget Bureau No. 04-R1047

THE UNITED STATES OF AMERICA
DEPARTMENT OF TRANSPORTATION
U. S. COAST GUARD

Port of ..... Certificate No. ....
(Date)

CERTIFICATE OF ADMEASUREMENT

I CERTIFY that an admeasurement has been made of the vessel described below:

Nationality.....	Builder's Hull No.....
Rig.....	Decks.....
Name.....	Masts.....
Port.....	Stem.....
Official No.....	Stern.....
Built by.....	Register length..... feet
When built (year completed).....	Register breadth..... feet
Place of build.....	Register depth..... feet
State.....	Register height..... feet
Material.....	

			TONS	100THS
Capacity under tonnage deck [1] ..... (Forepeak ..... Afterpeak .....)				
Capacity between decks, above tonnage deck				
Capacity of enclosures on the upper deck, viz:				
Forecastle	Deckhouses	Excess hatchways		
Bridge	Side houses	Light and air [2]		
Poop	Mast houses	.....		
Break	Trunks	.....		
GROSS TONNAGE				
Deductions under Section 4153, Revised Statutes, as amended (Section 77, title 46, United States Code):				
Crew space	Anchor gear	Donkey engine and boiler		
Master's cabin	Boatswain's stores	Radio house		
Steering gear	Chart house	Storage of sails		
.....	.....	.....		
Propelling power (actual space .....)		..... %		
		TOTAL DEDUCTIONS		
NET TONNAGE				X X X

The following-described spaces, and no others, have been omitted, viz:

Forepeak	Companions .....
Afterpeak	Galley .....
Other spaces (except double bottoms) for water ballast	Skylights and air shafts *not over* propelling machinery .....
Open forecastle	Wheelhouse .....
Open bridge	Water closets .....
Open poop	Anchor gear .....
Open shelter deck	Donkey engine and boiler .....
Open houses	Steering gear .....
Passenger cabins	Light and air over propelling machinery .....
.....	Other machinery spaces .....

....
Admeasurer. *Officer in Charge, Marine Inspection.*

I agree to the above description and admeasurement.

(SEAL)

.....
Owner, Master, or Agent.

[1] Give tonnage of each peak tank used other than for water ballast, which is included herein.
[2] These spaces are to be added to tonnage only by permission of the Officer in Charge, Marine Inspection.

GPO 932-430

6.5. PROPOSAL FOR A PILOT LOGBOOK STUDY

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Fisheries Center
Honolulu Laboratory
P. O. Box 3830
Honolulu, Hawaii 96812

September 26, 1977

To: W. G. Van Campen, Executive Director, WPRFMC

From: Richard S. Shomura, Director, Honolulu Laboratory

Subject: Proposal for a logbook pilot study

Enclosed is a proposal that the Council may wish to consider for support. I believe we all agree that good catch and effort statistics need to be collected from the recreational fishing sector operating in the Council's area. If done properly the pilot study will tell us if a voluntary log-book system will do the job.

I would like to recommend that the Council have the SSC review and evaluate this proposal.

Enclosure

PROPOSAL FOR A LOGBOOK PILOT STUDY

This is a proposal for a pilot study to obtain information needed to institute a logbook system for the purpose of collecting catch and effort data from recreational fishing boats. This proposal was written for the Western Pacific Regional Fishery Management Council (WPRFMC) to implement.

Background

The Fishery Conservation and Management Act of 1976 directs the determination of optimum yields for fisheries which are predominantly located within the 3 to 200-mile zone. This directive has made urgent the need for data on the biology, economics, and fishery operations of the pertinent fisheries. In the central and western Pacific Ocean the principal fish species covered by the Act are mahimahi, ono, and the billfishes. The billfishes include blue marlin, striped marlin, black marlin, shortbill spearfish, swordfish, and sailfish.

This is a pilot study of a logbook system which will encompass the areas of jurisdiction of the WPRFMC which are Hawaii, American Samoa, Guam, and the Northern Marianas. The pilot study itself will be limited to the Island of Oahu. This logbook system primarily addresses the need for data on total effort, catch, and catch per unit of effort of the recreational fisheries for the aforementioned species. These data are of foremost importance for management purposes. Although it does not address the needs for biological and economic data, some biological information will result from it. Because certain tunas--yellowfin, skipjack, kawakawa, frigate mackerels--are also caught by these recreational fishermen, data on tunas will be collected although the Act does not include tunas.

Because most of the billfish species have the potential for transocean migrations, data from areas other than the areas under WPRFMC jurisdiction will be eventually needed to complete the information needs. The logbook system that is being developed here can be used with minor adaptations in other centers of recreational billfish fishing in the Pacific. A common logbook for all areas would be the basis for uniformity in data collection and assure comparability among areas.

A logbook system is not the only method to collect the required data on effort and catch. The data may be collected by enrolling key persons in fishing clubs to do the work or by stationing personnel at all boat ramps to interview fishermen as they return from a day's fishing. The disadvantages in the former method are: (1) the quality and reliability of the data will differ from club to club and (2) not all recreational fishermen belong to a club. The barrier to interviews of fishermen at boat ramps is its prohibitive costs. The overriding advantage of a logbook system over the other methods is that with proper adherence to rules of statistical

sampling, the results obtained from a fraction of the fleet may be projected to obtain estimates of total effort and catch within desired confidence limits. The other methods do not lend themselves to compliance with sampling rules.

Data on billfish catches by commercial fishermen for the past 30 years are available from the Hawaii State Division of Fish and Game (HFG) which requires monthly catch reports from all who have purchased licenses to sell fish. A sizeable portion of the ono, mahimahi, and billfish (except swordfish) catches is made by recreational trollers. No organization collects data on this group of fishermen on a systematic continuing basis. Although their purpose for fishing is recreation, many recreational fishermen in Hawaii purchase commercial licenses which are required to sell fish legally. Their activities are recorded in the HFG files but it is not possible to separate the recreational data from the commercial data with certainty. Information on the amount of effort expended by the recreational segment of the billfish fishery, the amount of fish caught, and the size of individual fish caught is almost totally lacking.

A committee of NMFS personnel (Ray Sumida and Heeny Yuen) and HFG personnel (Clyde Miyazawa, Eric Onizuka, and Henry Sakuda) met to confront the problem of how to institute an effective logbook system in the recreational fishing fleet where fishing licenses are not required. This brought out the information needs that should be fulfilled before a full-scale launching of a logbook system. The proposed pilot study is for the purpose of obtaining the desired information.

Without a licensing program a voluntary logbook system seemed more appropriate than a compulsory system. The concept of a voluntary system opened up the possibility of using a sampling design to distribute the logbooks instead of placing a logbook on every boat. A reliable sampling program would reduce the cost of implementing the system. A sampling design requires a determination of sample size which in turn requires estimates of the means and variances of the variables being measured. Estimates of these statistical parameters are to be obtained in this pilot study.

The concept of a voluntary system influenced the design of the logbook. As a motivation to keep detailed logs, the logbooks will be given to the fishermen as personal logbooks with the agreement that the books will be collected periodically for data extraction and returned. A decision has yet to be made on which agency will be responsible for data management and storage. At this point HFG by virtue of its existing well organized, computerized system appears to be the most likely candidate.

The books were designed to have hard covers with data forms that included ample space for personal notes. Consideration was given to such details as content, simplicity of instructions, clarity, brevity, and styles of type to make the book attractive. In spite of this attention it is impossible to predict how fishermen will respond. The effectiveness of the logbook design in producing a positive response from fishermen is to be tested in this pilot study. At the same time fishermen will be invited to suggest modifications that would make it more conducive for the fishermen to fill out the logbook.

An important question to be answered by the pilot study is, "What is the cost of inaugurating and maintaining a logbook system?"

Implementation

1. Investigate printing costs of logbooks with attention to the most economical number and book dimensions.

2. Print 100 logbooks (draft sample provided).

3. Obtain list of registered boats for the Island of Oahu from the Harbors Division of the Transportation Department.

4. Derive a list of fishing boats from the above list and stratify the boats into a reasonable number (2-4) of categories by size and/or horsepower.

5. Randomly select boats from each strata so that the total number selected is 100.

6. Personally deliver a logbook to each of the selectees. At the same time explain the instructions for using the logbook, the purpose of the project, and how the project is being carried out.

7. Visit each selectee at one-month intervals to extract the data from his logbook. Any questions selectees may have on the use of the logbook should be clarified during these visits. Areas of difficulty in filling out the forms should be noted for the final critique on logbook design.

8. The final visit for data extraction will be at the end of 6 months. At the final visit interview the selectee to obtain a critique of the logbook and suggestions for improvement.

9. Analyze data by boat categories for number of respondents, ways of improving response to logbook, and ways of improving data extraction. Do an analysis of variance by boat categories of the number of hours of fishing, number of each species caught, and size of each species.

10. Keep a detailed account of all expenditures of time and money for each phase of the project.

11. Report findings.

Implementation of this study will require the services of one person full time with overall responsibility for the study and 3 part-time assistants. The study leader will be responsible for:

1. Publication of the logbooks.

2. Training of the assistants in conducting the distribution of the logbooks, the monthly visits, and the final interview.

3. Scheduling of visits.

4. Data analyses.

5. A detailed account of time and money expenditures.

6. The final report.

The assistants will be responsible for distributing the logbooks, the monthly data extraction visits, the final interview, and being clear on what is to be done and said in their contracts with the selected logbook holders.

Objectives

The objectives of the study are:

1. To introduce a logbook system to recreational fishermen.

2. To educate recreational fishermen to the use and value of a logbook system.

3. To estimate the number of respondents to a logbook system.

4. To realize an effective logbook design.

5. To estimate the means and variances of the number of hours fished, the number of each species caught, and the size of each species caught by individual boats.

6. To determine the sample size for an eventual logbook system.

7. To determine the cost of implementing a logbook system.

Estimated costs

The cost estimates are in thousands of dollars.

Salary of study leader full time for 8 months	$12.0
Services of assistants at $5 per visit	3.5
Printing of logbooks	.5
Printout of list of Oahu boats	.3
Transportation - automobile expenses	2.0
Computer services of data analyses	.2
Miscellaneous	1.5
	$20.0

RECREATIONAL FISHING LOG

DIVISION OF FISH AND GAME
STATE OF HAWAII

(ADDRESS)

cover

RECREATIONAL FISHING LOG

PROPERTY OF _____

ADDRESS _____

_____

ISLAND _____

NAME OF BOAT _____

OFFICIAL NUMBER _____

REGISTERED OWNER _____

TYPE OF BOAT _____ LENGTH _____

HORSEPOWER _____ OUTBOARD /__/ INBOARD /__/

RECREATIONAL FISHING LOG
furnished by _____

The intent of this book is to provide you with a log for your fishing activities and to furnish the Division of Fish and Game with information needed to determine the status of the recreational fishing resources. Determination of abundance requires accurate information on the number of fish caught, the size of each fish, and the amount of fishing effort expended in making the catch. You are urged to record each time you go fishing whether you catch fish or not. Feel free to enter any information of value to you regarding the operations of your boat. This is your opportunity to contribute to the conservation and perpetuation of Hawaii's game fish resources and to provide yourself with a permanent record of your fishing activities.

THIS BOOK IS YOUR PERSONAL PROPERTY SUBJECT TO INSPECTION ONLY BY AUTHORIZED REPRESENTATIVES OF THE DIVISION OF FISH AND GAME. THE FACTUAL DATA YOU SUPPLY WILL BE USED EXCLUSIVELY IN THE STUDY OF THE FISHERY.

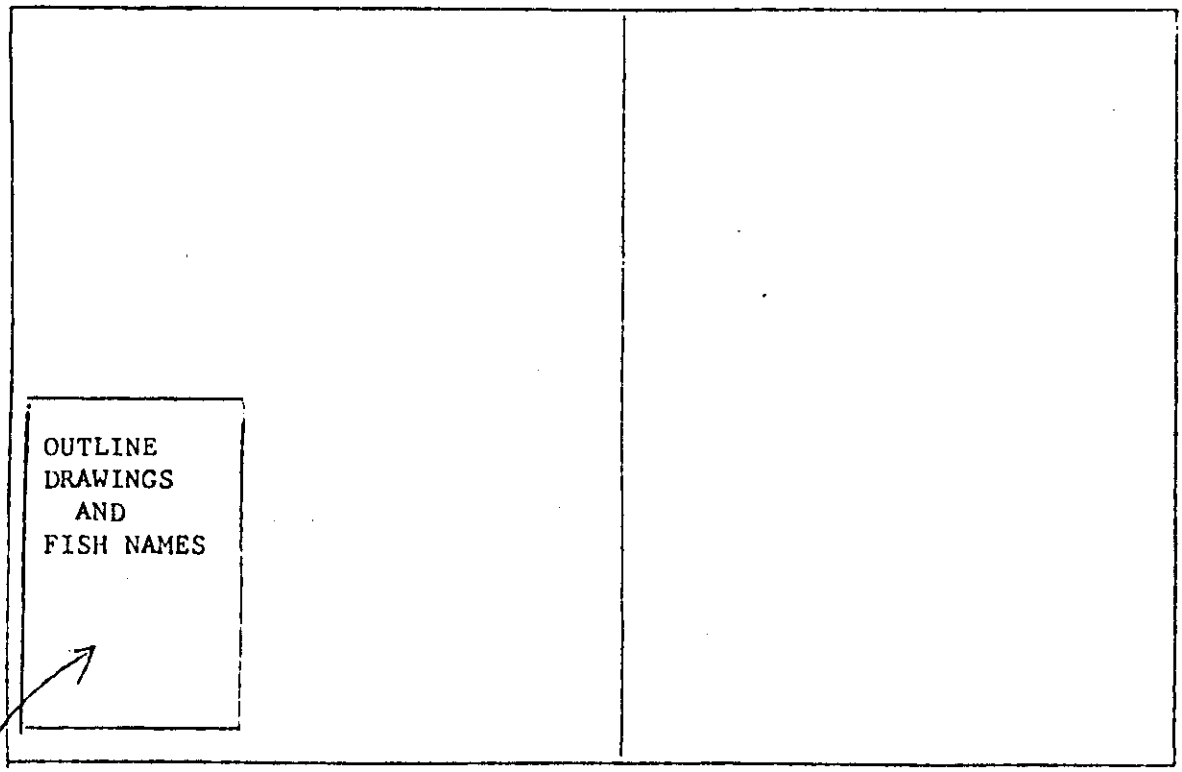
A sample page and the following instructions are included to assist you in keeping this record.

1. Record each fishing day whether fish are caught or not.

2. Record the time and location for each change in fishing area. The map on the next page indicates the area numbers. You may use area numbers or the common name of the area in recording location.

3. Under "Remarks" record any information which may be useful to you regarding your present or future fishing success.

AREA MAP



Blue marlin
Striped marlin
Black marlin
Shortbill spearfish
Sailfish
Ahi (Yellowfin tuna)
Bigeye tuna
Aku
Kawakawa
Mahimahi
Ono